

CP/M[®] REVIEW

THE PUBLICATION FOR THE CP/M COMMUNITY

JANUARY/FEBRUARY 1983 \$3.00



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"In The Beginning" was created by Richard Katz of the Vectrix Corporation in Greensboro, North Carolina. He was using the Vectrix VX384 color graphics processor operating with a Northstar Horizon computer using the PL 1 - 80 package under CP/M.

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CP/M[®] REVIEW

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JANUARY/FEBRUARY 1983

Volume 1, Number 2

FEATURES:

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POWER UP!

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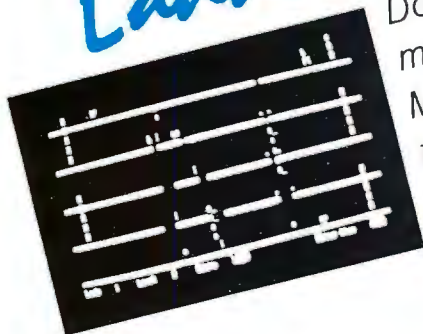
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From the Editor

A CP/M CONFERENCE!

CP/M'83 will be held in San Francisco's Moscone Center, January 21-23. Several hundred exhibitors will be there with the largest presentation of CP/M based hardware and software ever assembled. There will also be dozens of CP/M workshops led by world authorities, and thousands of people are expected to attend.

A few years ago, one could walk up and down the aisles of the exhibit hall at the NCC and see everything new in the computing world in a few hours. If you attended the NCC in Houston last fall, you found that the three days allotted for viewing the exhibits just wasn't enough time to see the massive amount of new products. The new trend in computer conferences appears to be vertically integrated, supporting special interest groups as opposed to trying to see everything new in the computer world at one time and place. A conference with some focus allows attendees to accomplish more by not having to deal with the crowds, confusion, and topics of little interest.

For those of you that won't be able to attend CP/M'83, we will cover the products and workshops presented during the three days in our March/April issue.

IN THIS ISSUE

With the great demand for software reviews and other topics, we have decided to temporarily forego the *HARDWARE BUYER'S GUIDE* for a few issues. We are continuing to build a file of new CP/M-based machines which will be used in future issues. *VIDEOTEX* is considered by many to be the precursor of the Information Society and the next great wave of new technology. In this first of two articles, the author introduces you to this new phenomenon. This

month the *dBASE II USER'S FORUM* begins as a regular feature, covering Ashton-Tate's relational database management system.

I would like to thank Richard Katz of the Vectrix Corporation for the computer art on our cover. With only a few days until press time, we learned our prior arrangements for a cover had fallen through. After many frantic phone calls (everyone was at COMDEX), we were able to get in touch with Mr. Katz. Needless to say, he came through with "flying colors."

Mr. Katz composed "In the Beginning" on a CP/M system, and has promised to describe the technique and equipment that he used in an article for our next issue.

COMING UP

CP/M REVIEW is building a pipeline of articles and authors. To mention a few things in the works, we are developing articles on CBASIC, evaluations of word processing programs, how-to-do tutorials on troublesome aspects of your computer, and a new look at the contents of the online information services.

If you have an idea for an article, feel free to send us your manuscript, or you can call one of our editors and discuss your idea -- it may be in the works or it maybe just what is needed. Also, it isn't necessary to be a writer to get an article on a particular subject in CP/M REVIEW. We have had several suggestions from people that want certain topics researched and presented. Any level of participation is welcome.

Letters, comments or questions to the editor are invited.

CP/M

Abstracts from Other Literature

CP/M-86 VS. MS-DOS A Programmers Perspective

by NEIL COLVIN

Microsystems, November/December 1982; page 47

This article reflects the comparison of Microsoft's MS-DOS and Digital Research's CP/M-86 through the authors' experiences of extensive CP/M-86 conversions to the 8086/8088 processors. The article is quite comprehensive and covers many areas of the internal structures of both systems. File structures and memory management are among some of the topics reviewed.

CP/M-86 VS. PC-DOS Benchmarks

by RAY DUNCAN

Dr. Dobbs, November 1982; page 46

The author presents his results of a timing study made on the IBM PC between Digital Research's CP/M-86 and Microsoft's PC-DOS.

Using dBASE II for Business

by MICHAEL TANNENBAUM, CPA
Popular Computing, January 1983;
page 38

Written in a lighter vein, this article looks at the use of Ashton-Tate's dBASE II to speed up office procedures. Many illustrations and examples with some tutorial.

The CP/M Bus: Using C Instead of Assembly Language

by ANTHONY SKJELLUM

Microsystems, September/October 1982; page 33

A qualitative overview of C as an alternative to coding in an assembly language. Brief, but complete, it covers formats, debugging, strings, pointers, storage allocation I/O redirection, and more.

Microshell and Unica: Unix-Style Enhancements for CP/M

by CHRISTOPHER KERN

BYTE, December 1982; page 206

Two Unix-styled software packages are reviewed by the author; Microshell by New Generation Systems and Knowlogy's Unica. The article describes the Unix-like command structures supported; Microshell's structure being a command interpreter compared to Unica's utility program approach. A brief note is made of an up and coming Unix-like product called MARC by Vortex Technology.

Autocontrol's AC-85... A CP/M System on One Board

by JOANNE BENEDICT

BYTE, December 1982; page 250

The author presents a hardware review of Autocontrol's AC-85, a single board computer. It consists of the assembled and tested board only and requires power supply and peripherals. The author describes the product, cabling schematics, as well as her experiences encountered in completing the hardware configuration.

CP/M-86 VS. MS-DOS: A User's Perspective

By STEVE LEIBSON

Microsystems, November/December 1982; page 34

As the title implies, this article highlights and compares some of the external characteristics of several areas of Microsoft's MS-DOS and Digital Research's CP/M-86. Both systems run in the 8086/8088 environment. In addition to a brief history of both systems, the article identifies aspects of commands, editors, batch processing, files, memory structures, BIOS accessibility, etc.

CP/M Exchange

by GENE HEAD

Dr. Dobbs, October 1982; page 42

The entire column this month is dedicated to the use of a remote CP/M system (RCP/M) using various MODEM routines. Included are helpful hints to make your mail system and remote computer sessions run more smoothly.

Submit to CP/M

by WESLEY E. BARBOUR

Microcomputing, October 1982; page 64

The author gives examples of using user defined functions embedded in programs to ease the use of the CP/M SUBMIT facility in chaining programs. Example listings are provided.

Interrupts and CP/M

by ALAN BOMBERGER

Dr. Dobbs Journal, November/December 1982; page 54

The article illustrates the use of interrupts to provide a fully buffered console to CP/M. In other words, he addresses the problem of being able to type ahead at the command level. After outlining the necessary background on interrupts, the design concepts are presented. There is some emphasis on the Northstar system. The operation of the programs presented are explained in excellent detail. Assembly listings are provided.

Sensible Speller

by ROBERT MOSKOWITZ

Interface Age, October 1982; page 82

This is a software evaluation of an interesting program that will run under CP/M. The vendors have taken an interesting approach of providing a hard copy dictionary with the disk. The dictionary is the Random House Concise Edition which includes over 74,000 words. The article points out that the system can be used with several common word processing systems. Non-word processing applications are mentioned.

A Super CP/M Utility

by DICK LUTZ

Microcomputing, November 1982; page 122

This article evaluates a CP/M Catalog Program which is marketed by Elliam Associates. The program apparently has its origins in the public domain, but he concludes that the commercial version is worth the price of \$10. A discussion of its usage and advantages follows with several detailed examples.

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CP/M[®] 3.0 RECEIVES LAST TOUCHES

At the same time that CP/M 3.0 receives final touches before introduction this fall, CP/M 2.2 sales have reached an all-time high. According to Digital Research Chief Operating Officer John Rowley, "Just when our 2.2 orders have reached a peak, we are approaching the introduction of our latest version of CP/M - CP/M 3.0. We expect immediate acceptance of the new 3.0 version by OEMs when it is released."

Lots of companies are offering more than 64K, and we wanted to give them the performance that is possible with more memory."

CP/M 3.0 will be fully upward-compatible with CP/M 2.2 at the functional level. Application software will require no changes to execute under CP/M 3.0. Two versions of the operating system will be available: a smaller non-banked, or resident, system and a larger bank-switched

"It's going to be a greatly improved product with better performance and greater user-friendliness."

With 8-bit hardware sales running strong, Digital Research's industry-standard CP/M 2.2 operating system continues its sweep of the 8-bit field. More than 700 OEMs are using CP/M 2.2 and more 3000 application programs have been written for the operating system. Industry experts estimate that some 700,000 microcomputer users are taking advantage of CP/M 2.2 capabilities at the present time.

The appearance of National Semiconductor CMOS Z-80 equivalent devices, the Zilog Z800, and the 10 MHz Intel 8085, plus the trend toward larger memory in 8-bit hardware, indicate that the 8-bit microprocessor will remain strong through the 1980s, Rowley commented.

MORE MEMORY

Explaining Digital Research's commitment to 3.0 during a period of continuing 2.2 success, Kathy Strutyński of DRI's Operating Systems Strategic Business Center said, "We recognize that there is hardware out there now that can do more.

system which provides increased space for programs.

At the moment, CP/M 3.0 is being selectively beta-tested at a small number of sites with some large OEMs receiving early releases for informal evaluation.

"We've combined our years of experience with the CP/M product line and the valuable input we've received from our OEMs and end-users in our design of CP/M 3.0," said Kathy Strutyński. "It's going to be a greatly improved product with better performance and greater user friendliness. Our major design objective was simplicity."

File system performance is improved through the use of directory hashing, record buffering and reduced disk selects. The use of these features is limited in the non-banked version because of memory requirements.

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CP/M'83 IS SCHEDULED IN SAN FRANCISCO, JANUARY 21-23



CP/M'83

USER FRIENDLY

The operators of business software will note a friendlier environment with such features as an auto-login allowing diskette replacement without a disk reset of CTRL-C; date and time stamping for file creation; access and update; a HELP facility; and a console input/output redirection facility which allows the input to be read from a file or output to be written to a file. In addition, the USER facility is enhanced to allow the operator to store commonly used transient programs under USER 0 and access these programs from any USER number.

Application environments are made possible through new operating system functions which allow the application program to determine free disk space, chain to another program and trap physical errors. Other enhancements included in CP/M 3.0 provide MP/M II compatibility and support of larger files and drives.

Hardware environments for both banked and non-banked systems must include an 8080, 8085 or Z80 CPU, disk devices (at least one floppy and at least two drives, one of which can be a hard disk), a console, and a printer is recommended. The banked version will require a minimum of two banks with the top region (4-32K) in common and the low region bank switched; the non-banked system requires approximately 4K more than CP/M 2.2.

Digital Research Inc. will sponsor CP/M'83 -- an international conference and exposition for end-users, developers, distributors and retailers of CP/M software -- January 21-23 in Moscone Center, San Francisco. The show will be produced by Northeast Expositions, Inc. a major producer of public computer shows.

CP/M'83 will feature hundreds of exhibits that will showcase the full spectrum of applications packages, development aids, peripherals, accessories, publications and services available to microcomputer software users. In addition, dozens of workshops, led by world authorities on CP/M, including representatives from Digital Research, will help those who attend the show understand, use, develop and market CP/M software.

Thousands of people are expected to fill Moscone Center for the event this January. A large scale advertising and promotion effort, with advertisements in the major computer

magazines, as well as displays and literature at distributorships and retailers, is aimed at attracting attendees. A direct mail campaign also is targeted at some 700,000 CP/M users.

Northeast Expositions, which is working directly with Digital Research in the production of CP/M'83, has produced other major computer expositions and conferences, including National Computer Shows and Applefests in major cities around the country.

Further information on CP/M'83 is available from Northeast Expositions, Inc., 824 Boylston St., Chestnut Hill, MA 02167; (617) 739-2000.

Following CP/M'83, Digital Research will present a seminar, January 24-28, for ISVs in Pacific Grove, CA. Details may be obtained from Seminar Coordinator Peggy Anderson, P. O. Box 579, Pacific Grove, CA 93950; (408) 646-6012.

COMPATIBILITY THE KEY TO CP/M

CP/M also support compatibility by defining a standard for data interchange. Application programs can operate on a data file and that file can be moved to another system. Because of the standard CP/M format, the other system may contain a different type of CPU (e.g. 8080/Z80 disk moved to an 8086/8088), or a single system could contain two CPUs simultaneously and a single data file could be manipulated by programs running on either CPU.

In addition to hardware and data compatibility, the CP/M family of operating systems ranges from single-user, single-tasking (CP/M) through networked (CP/NET[®]) and single-user, multi-tasking (Concurrent CP/M) to multi-user, multi-tasking (MP/M[®]). Applications programs which adhere to the CP/M standard interface can run on all of these compatible operating systems. This provides the user with an upgrade path as requirements and

The key to the success of CP/M as a widely accepted operating system is compatibility. This compatibility ranges from hardware compatibility, data interchange and flexible operating system options to a vast array of compatible software.

The CP/M operating system's primary feature is its ability to support the concept of "Object Code Transportability." This means that a program which works on one CP/M system will work on another CP/M system even if the CPU, disk, terminal and printer are all different. One system could have an 8080, a mini-floppy, a teletype and a matrix printer while another could have a Z80, a hard disk, an intelligent terminal and a letter quality printer. The user software interacts with these devices via CP/M which hides the differences so that each application program perceives the system to have the same basic capabilities.

continued on page 15

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hardware grow. No other microcomputer operating system family provides such a broad range of operating systems while still maintaining object code transportability.

SOURCE CODE TRANSPORTABILITY

Just as CP/M provides object code transportability, Digital Research provides source code transportability using out line of quality languages. Programs written in a Digital Research language run virtually unmodified across the entire range of CPUs on which CP/M is running (8080,8086/ 8088 and 68000).

This provides the software writer the opportunity to write an application program once and distribute it to a wide audience of computer owners with different hardware configurations and different CPUs. The program maintenance and improvement costs are significantly lower which means that the software writers can provide improved functionality to all of their uses simultaneously.

In addition to compatibility between machines containing different CPUs, Digital Research provides productivity tools which provide compatibility between programs written in different languages and between programmers.

INCREASED FLEXIBILITY

Access Manager® provides a common data file format between programs written in different languages just as CP/M provides a common disk format between different configurations and CPUs. Programmers now can write applications which create indexed data files and manipulate the file in whatever language is convenient.

No longer is a user required to use the language the software was written in, but may use the language the user is most comfortable with. This greatly increases the flexibility of an application program for both the user and the software writer.

Display Manager® provides a portable interface to display devices. Screen oriented programs can now be written which need not be manually reconfigured for each terminal device. A software writer can use such features as highlighting and underscoring and if the user's terminal does not have these features, Display Manager will automatically adapt to

the user's hardware. This will increase the availability of software which uses display devices efficiently. It also will provide a method for owners of less capable terminals to use the software without customization.

For the systems level programmer, the Symbolic Instruction Debugger (SID®) is a tool which is compatible with Digital Research languages. The linkers which accompany the language products can produce a .SYM file containing information regarding the location of variables and subroutines in the compiled and linked program. The user then can set breakpoints, display and modify memory using symbolic names. This provides the programmer the ability to debug without remembering where the linker located each item in the computer's memory.

Also for the systems programmer is XLT86® which will convert assembly language programs for the 8080 into their equivalent program for the 8086/8080. Unlike other con-

verters, XLT86 actually compiles the 8080 assembly language into 8086/8088 assembly language, keeping track of register and flag usage so that the resulting code is a true optimized translation and not just a transliteration.

AUTHORS:

Your literary contributions are invited. As a publication dedicated to the CP/M community we are, of course, looking for related articles. However, we are also interested in the computer industry as a whole. Please send your typed (double-spaced) items to CP/M REVIEW, 2711 76th Avenue Southeast, Mercer Island, WA 98040. Unacceptable manuscripts will be returned if accompanied by sufficient first class postage. Not responsible for lost manuscripts or photos.



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POWER UP!

A guide to understanding the internal happenings of your computer.

by Stu Stern

For those of you who have often wondered about or wished to have an understanding of your computer's internal happenings, this article will provide insight into that activity. In addition, some of the rudimentary functions of the "operating system" will be discussed.

In the wake of rapidly changing technology, microcomputers and related software have become sophisticated and relatively inexpensive. As a result, microcomputers are now used in a large percentage of our daily activities, both in business and the home. Because of the "human engineered" aspect of this technology, people now operating this equipment no longer need the technical expertise that was once required. The computer is now analogous to an appliance, a piece of office equipment, or a game; when needed, it is merely turned on and enjoyed. From the instant in time when the microcomputer is "turned on" to the moment it is ready for use, a lot of activity has taken place.

A computer does not have a native intelligence. It will not do anything (execute) without appropriate instructions (the program sometimes referred to as "software"). The initialization process, with respect to the software, is to load the operating system (or a portion of it) into memory and to execute it. In most disk-oriented microcomputer systems, six steps comprise the startup procedure:

1. System reset.
2. Jump to a permanently resident program.
3. Loading of the system loader program.
4. Jumping to and executing the system loader program.
5. Loading the operating system program.
6. Jumping to and executing the operating system program.

Once your microcomputer is powered on or the "reset" button is depressed, the electronics notify all microcomputer components of the system reset so that each component, in turn, may perform any electronic or logical initialization required.

In general, most microprocessors are architecturally designed to initiate the execution of instructions by forcing a "jump instruction" (automatically jumping) to a specific location in the computer's memory. This area of memory must contain a small program, known as the "bootstrap". It is the bootstrap's function to "start" the process of loading the operating system from disk into memory. In a good percentage of microcomputer systems, the bootstrap program is relatively small in size and is written to load only one sector of disk information into memory.

At this point, a slight difficulty is encountered. The normal storage or memory used by you and your programs is called RAM (Random Access Memory). Programs and data may be stored and retrieved from RAM, but once power is removed from the device, the contents are lost. The bootstrap, therefore, must reside in a non-destructable memory device called a ROM (Read Only Memory). ROM does not have the destructive properties of RAM, during power shut down, and will permanently maintain the program inscribed on it. Like its name implies, however, programs or data cannot be stored in it by you, without possessing the appropriate hardware.

It should be noted that micro systems that do not have a disk, and immediately appear in the Basic Interpreter, terminate their initialization process here. These systems lack the support of a fast storage media and must rely on the system being per-

manently resident within the microcomputer system. In comparison to the bootstrap program, the Basic Interpreter program resides completely in ROM (which includes some form of a primitive operating system).

Within CP/M, the bootstrapped disk sector contains the "boot" program. The boot is designed to load the operating system itself. In more extensive systems, the boot would load an elaborate system loader, which would load the operating system in turn.

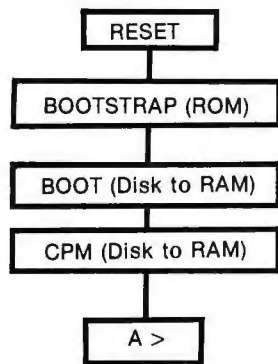


FIGURE 1. Initialization

After the boot program has loaded and transferred control (jumped) to the operating system, initialization processing is complete. Receiving control, the operating system will either search for an initial program to execute (if the capability exists), or request its first command from you, via the console.

WHY YOU NEED AN OPERATING SYSTEM

The operating system program itself can be thought of as the "supervisor" of the system. It establishes the environment under which you will work. The facilities provided by this environment will differ with respect to the kind of processing for which your computer has been designed. Most of the micros used in business, schools, or offices have a particular orientation, such as word processing or computer-aided instruction. However, most systems are supported by a general purpose operating system. The services offered are general in nature, and a wide variety of utilities are provided.

The operating system provides three categorical functions:

1. Control and Management. It provides for the control and

management of the computer's resources, such as, command processing, job control, memory allocation, disk file allocation, internal timing sequences, etc.

As mentioned earlier, the computer cannot think for itself and requires some portion of the operating system to be resident at all times to help and support the programs. This function of the system is hierarchical in nature and is synonymous to a program without end. When you "powered-on" or "reset," it was there to prompt you for your first command. Later, when you initiated a program, the operating system loaded, executed, and supported it throughout the program's duration.

To further illustrate this, let's review the life cycle of a typical transient program, such as word processing, a spread sheet, or a file copy utility:

- The user is prompted for the next command, via the console.
- The user requests, through the appropriate command, the execution of a specific program.
- The operating system, via the Command Processor, interprets the command, determines what command has been input and jumps to that portion of the system to initiate the user request.
- The program is brought from disk and loaded into the microcomputer's memory, at a designated location. Control is transferred to the program by the operating system jumping to the first executable instruction of that program.
- While in control, the transient program can use the services and utilities that reside within the operating system's environment.
- When the program has completed, it jumps back to the operating system, which in turn requests the next user command by displaying the prompt symbol on the console.

In more sophisticated systems, "multi-tasking" is possible. Multi-tasking means that more than one transient program (a synonym for task) can be running simultaneously. In this environment, it is not possible for the operating

system to turn control over to a single program and let it run until completion. All programs must run concurrently. This sharing of the microprocessor is accomplished by a module called a "scheduler" or "dispatcher". There are several techniques used to switch execution from one program to the next. The algorithm used is a function of the type of processing desired (i.e. all programs are to share computing time equally, such as in a multi-user system; some programs must run faster than others, as in a communications network environment).

2. Housing Primitive Programs. The operating system houses the primitive programs required to control your microcomputer's unique hardware components.

These programs support the detailed specifications required to manipulate each of your microcomputer's components (i.e., reading a character from the keyboard, positioning and placing a character on the CRT, performing the multiple steps, and timing sequences required to access data on a disk, etc.). In addition, conversion routines (such as ASCII to hex) and internal system utilities are also provided.

For example, while programming in a language such as BASIC, you input a character from the keyboard. Most "higher level" languages will not input the character directly, but will use the services of the operating system and "request" a character be read from the keyboard. The use of the system's primitives or "drivers," as they are sometimes called, eliminates the need to re-invent the wheel and provide for optimized programming, in terms of speed and compaction of program size.

Each computer system can, for conversation sake, be considered different. Even if you have purchased the same system as a friend, it's probably safe to say that given time your system will change, with that brand X printer that you found on sale or the brand Y music board that you added for the kids. It is through the use of the system's drivers and "standard" driver interfaces (calling procedures) that the impact of these hardware component differences are absorbed.

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\$1790

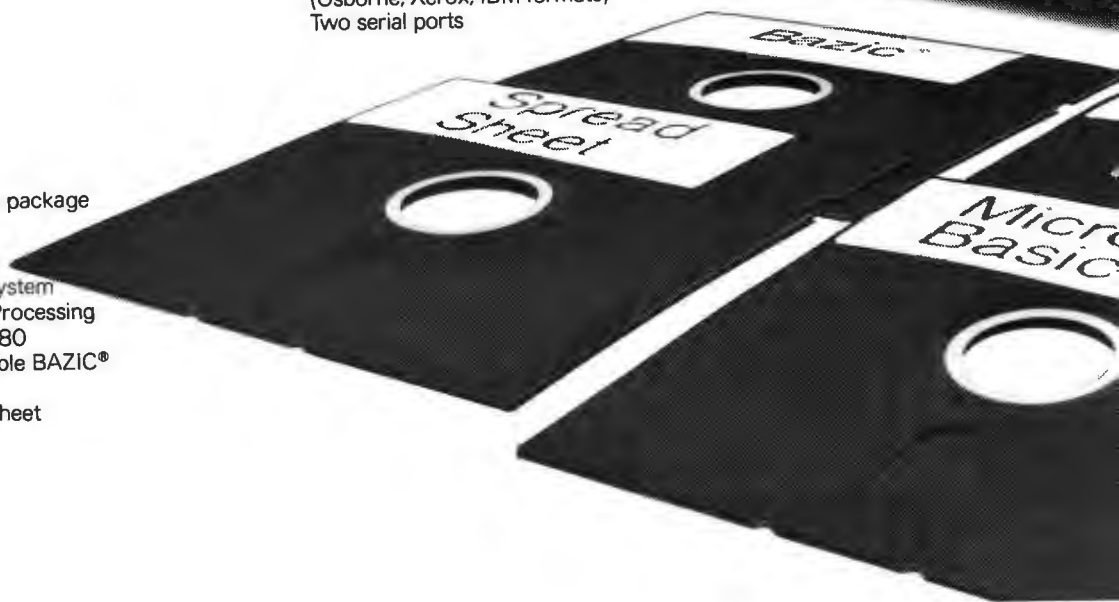


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A New CBASIC Users Group Needs Your Support

At your last computer club meeting the secretary probably read the letter that follows, or it was reprinted in the club newsletter.

September 9, 1982

Dear CP/M Users,

I obtained your name from Digital Research's list of CP/M users groups and am writing to ask for help from your group.

I have wondered for years why there was no users group for CBASIC users. I have used CBASIC myself since 1978 and find it to be a very good programming language for business applications.

If I can generate enough interest to gather several disks of CBASIC, CBASIC-86 or CB-80 source code, I will undertake to operate a CBASIC users group. The primary goal of this group would be to distribute public domain business and professional software. Although I have no interest in games, if the interest is there, they could be gathered together and distributed separately.

If possible, please distribute copies of this letter to anyone who might be interested and let me know if your group distributes any CBASIC public domain software at this time. If so, how may I arrange to distribute copies through the CBASIC USERS GROUP?

Sincerely,

SIGNED

Caddy McCall
P.O. Box 26321
Austin, TX 78755

Your Public Domain editor decided to look a little deeper and see if Mr. McCall was ready to give the time and assume the responsibility that such an undertaking would require. We found that he is a very public-spirited individual and has worked out most of the details to get the user group underway.

CP/M REVIEW intends to support his effort. The following are his initial thoughts and ground rules, however, he is open to suggestions for improvements and can be contacted at the address below.

Objectives of the group. The purpose of the CBASIC USERS GROUP is to make it possible for business and professional users of CBASIC, CB-80 and CBASIC/86 to stop reinventing the wheel and share proven software among themselves. This could be anything from a short useful routine (such as a perpetual calendar program) to an integrated general ledger system. Initially there is no interest in games.

Fees. The initial membership fee is \$20.00, which includes the first year's dues. Thereafter, the annual dues are \$10.00 per year. The fees cover an ad hoc Newsletter which will include general CBASIC news; new contributed software, and a current list of available programs. Contributors of public domain software will have one year's dues waived.

Membership. Persons seeking membership should fill out the following questionnaire and forward to:

CBASIC USERS GROUP
c/o Caddy McCall
P.O. Box 26321
Austin, TX 78755

Distribution of software. Initially the distribution format will be limited to 8" CP/M standard single density floppy disks. Some arrangements are being made to distribute in other formats and by electronic mailboxes; we'll keep you informed in this column. Bona fide distributors of public domain software (non-profit organizations, clubs, etc.) will be granted permission to redistribute, and in fact are encouraged to do so. The fee for direct distribution is \$12.00, which includes a new 8" floppy disk and shipping in a protective container.

Documentation. All contributed software must be accompanied by a .DOC file containing information to allow a beginning CBASIC programmer to adopt the program to his system. The .DOC file should also contain the minimum hardware requirements; main memory etc., and any other comments that will ease the implementation.

Logistics. To contribute a program:

- 1) Prepare an 8" single density CP/M disk with a well commented source listing of the program and the .DOC file.
- 2) Fill out and sign the "Statement of Transmittal".
- 3) Be sure to include application of membership if not a member for the waiver of fees.
- 4) Mail to the address above.

A final word. Mr. McCall is combing the existing sources of public domain software for programs that satisfy our objectives. If that search yields anything it will only take a few pioneers to get this worthwhile effort off the ground. Search through your volumes of software.

CATALOG OF PUBLIC DOMAIN SOFTWARE

The New York Amateur Computer Club, Inc.(NYACC) announces the availability of Book 3 of the Catalog of Public Domain Software. This 266 page catalog contains tables of contents and abstracts of the files, and document files contained on diskette volumes published by the CP/M Users Group and the SIG/M (Special Interest Group/Microcomputers).The public domain software libraries contain languages, applications packages, utilities, games and much more.

The price is \$10 plus \$1 for handling and can be ordered from:

New York Amateur Computer Club
Box 106
Church Street Station
New York, N.Y. 10008

For further information contact:
Susan Perricone 212 243-0325

TO THE CBASIC USERS GROUP:

Program name:_____ Date:_____

Original author:_____ Date:_____

Latest revision:_____ Date:_____

Contributed by:_____ Date:_____

Restrictions on usage:_____

Program file name:_____ Doc file name:_____

Purpose of program:_____ Version:_____

Additional documentation available from:

Name:_____

Street:_____

City:_____

Source language:_____

Req'd software:_____

Req'd operating system:_____

Req'd hardware:_____

Req'd hardware mods:_____

Req'd software mods:_____

Difficult to modify? 1=very easy, 10=very difficult:_____

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NOTES:

THE FLEXIBILITY OF C

by Bill King

The C programming language was created in the early 1970s by Dennis Ritchie and Brian Kernighan, computer researchers at Bell Telephone Laboratories in Murray Hill, New Jersey. They were frustrated with the limitations of existing languages and systems for minicomputers. C was designed as an operating system development language and with it, Ritchie and Kernighan wrote the popular Unix operating system. Unix and C grew up together.

The features that make C a good operating system development language make it a outstanding microcomputer application language: flexibility, efficiency, portability, and readability.

FLEXIBLE OPERATORS

C has the usual operators for addition, subtraction, multiplication, and division, but C also has built-in operators for modulus division, shift left, shift right, bit-wise AND, bit-wise OR, bit-wise exclusive OR, and bit-wise NOT.

Sample C Operators

<code>x % n</code>	the remainder of <code>x</code> divided by <code>n</code>
<code>x << n</code>	the value of <code>x</code> shifted left <code>n</code> bits
<code>x >> n</code>	the value of <code>x</code> shifted right <code>n</code> bits
<code>x & n</code>	the bit-by-bit AND of <code>x</code> and <code>n</code>
<code>x n</code>	the bit-by-bit OR of <code>x</code> and <code>n</code>
<code>x ^ n</code>	the bit-by-bit XOR of <code>x</code> and <code>n</code>
<code>~x</code>	the bit-by-bit complement of <code>x</code>

The C philosophy is not to hide the underlying hardware architecture, but to make it accessible in a formal and straight-forward manner.

For machines that have a fetch-and-increment instruction:

```
i++
```

is equivalent to:

```
i = i + 1
```

but can be used anywhere a reference to `i` is used. Like:

```
while (i++ < 23) {
    . . .
}
```

Bill King develops imbedded operating systems for sophisticated X-ray imaging systems at Ratel Labs, Inc., a Sunnyvale, California based medical instruments company. He has worked in communications and aerospace companies developing software tools. He refuses to work at a company that doesn't use C.

which compares `i` to 23 then increments `i`. Similarly, `i--` is fetch-and-decrement, `++i` is increment-and-fetch (i.e., uses the incremented value of `i` for the rest of the expression) and `--i` is decrement-and-fetch. Even on machines that don't have fetch-and-increment instructions, the increment and decrement operators help C generate more efficient code.

FLEXIBLE CONTROL STRUCTURES

The C IF-THEN-ELSE looks like:

```
if (condition) statement1;
else statement2;
```

The IF and ELSE are disjoint statements, as in PL1. The ELSE matches the closest un-ELSE'ed IF, making it necessary to insert empty ELSE's on occasion:

```
if (condition1)
    if (condition2) statement2;
else;
else statement3;
```

C is block-structured, which means any place a single statement is allowed, a whole block of statements is allowed. In C the block delimiters are "{" (left brace) and "}" (right brace). The example above could also be written:

```
if (condition1) {
    if (condition2) statement2;
}
else statement3;
```

C has a WHILE and DO-WHILE (i.e., REPEAT UNTIL):

```
while (condition) statement;

do {
    statement;
} while (condition);
```

The body of the DO-WHILE loop is always executed at least once, but the body of the WHILE might not be executed at all.

C has a very flexible FOR loop that has the form:

```
for (init; condition; increment)
    statement;
```


The FOR usually looks like:

```
for (i = 0; i < 12; i++ . . .)
```

but is not limited to arithmetic operators:

```
for (c = getchar (); c != ' '; c = getchar ());
```

reads characters up to a blank. The "!=" is "not equal to" an adaptation of PL/1's "=".

Two statements unique to C are BREAK and CONTINUE. BREAK transfers control outside the nearest WHILE, FOR, or DO-WHILE loop. CONTINUE transfers control to the end of the nearest loop; to the CONDITION part of the WHILE and DO-WHILE, the INCREMENT part of the FOR. At first, these two control statements don't appear to be particularly useful, but they make many common program segments simpler and more straight-forward.

Take the following code segment that counts the letters in a sentence, ignoring blanks and tabs:

```
for ( count = 0; ; ) {
    c = getchar ();
    if (c == ' ')continue;
    if (c == '\t')continue;
    if (c == '.') break;
    count ++;
}
```

The FOR loop has only an INIT part, no CONDITION or INCREMENT and serves as a DO-FOREVER loop. GETCHAR () is a function that returns the next character of input (from the terminal). The '\t' (backslash-t) is shorthand for the tab character. When blank or tab are input, CONTINUE transfers control to the (nonexistent) INCREMENT part of the FOR, then loops. When a period is input, BREAK transfers control out of the FOR. All other input increments count.

The C CASE statement is a little obscure, but again, very flexible. The general form is:

```
switch (expression) {
    case 1:
        statements;
        . . .
        break;
    case 2:
        statements;
        . . .
        break;
    case n:
        statements;
        . . .
        break;
    default:
        statements;
}
```

EXPRESSION is evaluated and the appropriate CASE executed based on the value. The choice of SWITCH as the keyword for this construct is unfortunate (rather than CASE, and some other notation to denote the CASE items), but the really peculiar part is that one CASE can "fall into" the next if not terminated with a BREAK. We could rewrite the program above that counts letters with a SWITCH, like this:

```
for ( count = 0; ; ) {
    switch (getchar()) {
        case ' ':case '\t':
            continue;
        case '.':
            break;
        default:
            count ++;
            continue;
    }
    break;
}
```

CASE blank "falls into" CASE tab and both execute the CONTINUE which forces a loop. CASE period BREAK's out of the SWITCH, then BREAK's out of the loop. DEFAULT (all other characters) increments COUNT and loops.

FLEXIBLE DATA STRUCTURES

C has Pascal-like record types that allow related data items to be tied together with a single name. C calls them structures.

```
struct employee {
    char last_name (20);
    char first_name (10);
    char middle_initial;
    int idnum;
} worker1;
```

defines a generic EMPLOYEE data structure that consists of a 20 character last name, 10 character first name, single character middle initial, and an integer identification number. WORKER1 is a single instance of EMPLOYEE. The structure parts are accessed like this:

```
worker1.middle_initial = 'C';
worker1.idnum = 12345;
name = worker1.last_name
```

C allows variables to be assigned to machine registers to improve efficiency. As the number of user-assignable registers varies from machine to machine, this can only be treated as a request, but assigning just a few critical variables to registers can significantly improve execution speed. The statement:

```
register int i;
```

declares i to be an integer and assigns it to a register.

C has a very flexible pointer type. Pointers are declared as pointing to a particular data type, like pointer to integer, or pointer to character, but can point anywhere in memory.

```
char *p;
```

declares p to be a pointer to characters and:

```
for (p = 100; p <= 200; p++)
    *p = '0';
```

set memory locations 100 to 200 equal to character 0.

Pointers to structures are allowed, as are pointers to pointers and pointers to functions, which makes for variable function calls. Pointers assigned to registers are usually used to step through large arrays in an efficient way.

You can take the address of any data item with the "address of" operator.

```
char item1;
p = &item1;
```

sets p pointing to ITEM1.

continued on page 75

THE SERIAL CONNECTION

How to overcome the incompatibilities of your RS232C interface.

by A. Thomas Heany

The majority of peripheral devices on the market today such as modems, terminals, and printers are offered with a plug compatible method of interconnection known as the RS-232C interface. While this interface is one of the most standard things in the computing industry today, differences between manufacturers and device application cause incompatibilities that must be overcome in actual use. In many cases, devices can be connected with a simple cable, available from Radio Shack or your local computer store, and the devices will function without any problems. In many cases the device will go into paper weight mode and do little more than use electricity. In the second case, the user has two options; hire someone to interface the device to the machine (and at \$40 to \$75 an hour, this can cost as much as the device), or by a simple procedure, it can be done by the user.

THE RS-232C STANDARD

The IEEE RS-232C standardizes electrical cabling, and data protocol necessary when interconnecting two data devices. The constant electrical voltage and amperage levels insure that all RS-232C lines can be interconnected without damaging the respective devices. The cabling standard makes these interfaces plug compatible; the data protocol insures that the data sent over the lines will contain the correct number of bits in the correct order at the correct speed.

RS-232C VOLTAGE LEVELS

The RS-232C interface has three types of lines which are signal, handshaking, and ground. The signal lines carry the data between two devices, such as a computer and a terminal, or a terminal and a modem. The ground lines insure an equipment ground, and form a circuit for the signal and hand-

shaking lines. The handshaking lines determine if the devices are ready to transmit and receive data.

SIGNAL: The signal lines are held at approximately -16 VDC. When a data bit comes down the line the voltage is pulled to zero; in some cases it's pulled positive. Therefore, when the signal line is inactive it is negative; when data is being transmitted, the line alternates between negative and ground. For the purpose of interfacing, the most important thing to remember is that the signal lines are negative when compared to line seven, which is signal ground.

GROUND: There are two ground lines available; the signal ground line and the chassis ground line. These are both held at 0 VDC, but line seven is held at zero in respect to the signal and handshaking line. The chassis ground line connects the two devices and protects them from static and voltage biases.

HANDSHAKING: The handshaking lines are positive when ready, and ground or negative indicating a not ready condition. No signals or wave forms are sent over these lines. The simple state of either positive voltage or no voltage is the only activity on these lines. This makes the handshaking lines easy to intermix and differentiate from the signal or ground lines.

Cabling Conventions. The RS-232C cabling convention calls for the use of a standard 25 pin connector referred to as the DB-25. While the DB-25 has 25 lines available, only nine are commonly used; lines one through eight and twenty. The additional pins can be used for interfaces such as the current loop or TTL standards, which are often offered as alternatives on many devices.

The nine pins can be divided into



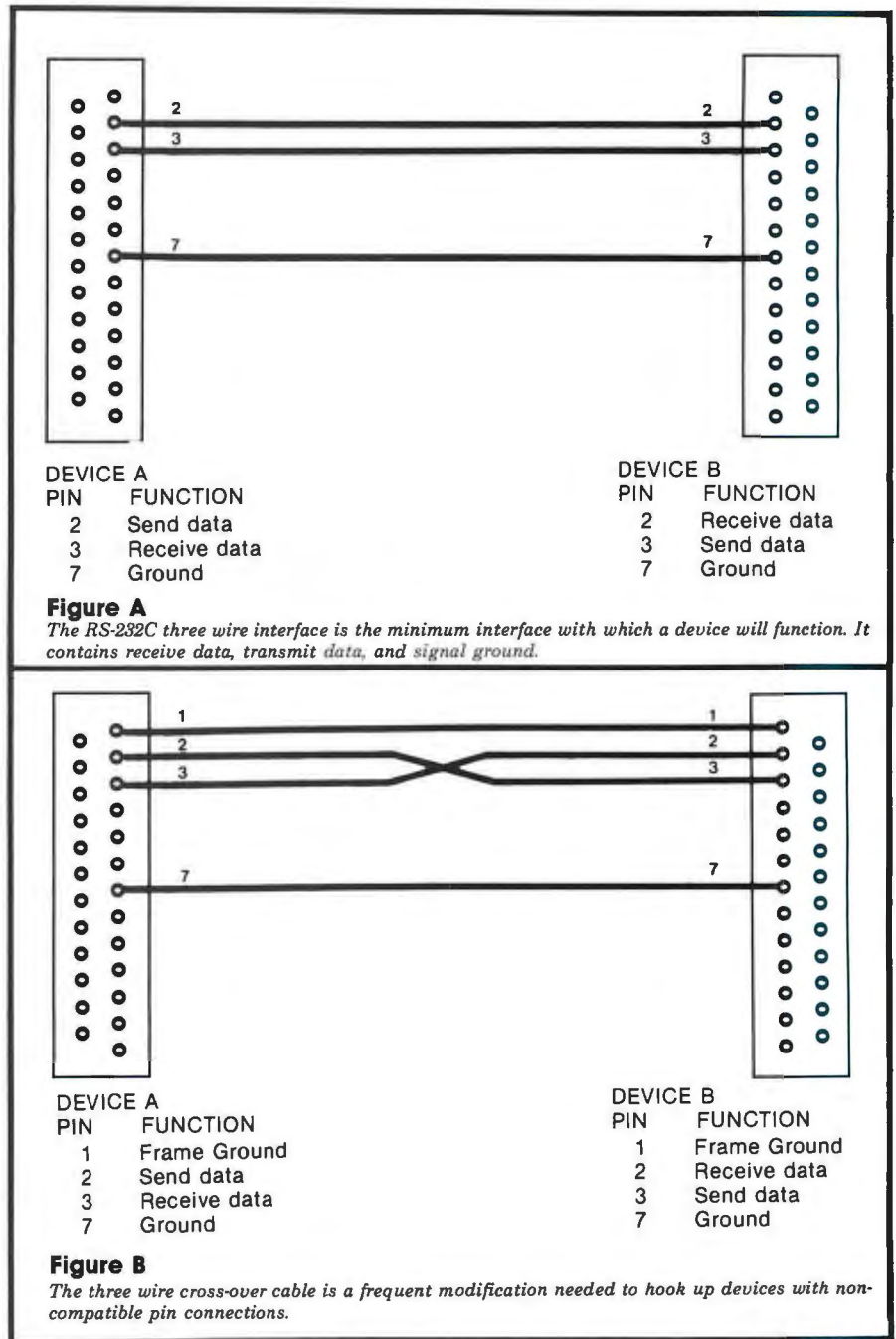
Tom Heany, BA MA, is a computer contractor residing in Washington. He specializes in software development and hardware interface. He has developed several major commercial software packages for minicomputers and CP/M, including a mail merge package and two inventory control packages. He has implemented many direct connect and telecommunication devices to a variety of small computer systems.

the same three groups mentioned above; the signal lines, the handshaking lines and the ground lines. These three groups are distinguished from each other by function, connector position, and electrical characteristics.

Ground. The ground lines are the easiest. When constructing a cable, pin seven is always connected to pin seven, and pin one is always connected to pin one. Pin seven is the signal ground wire and must always be connected. Pin one is the chassis ground. It's the equivalent to the third prong on a household electrical plug. Leaving this pin unconnected can cause disaster.

Signal. The signal lines are a bit more difficult. Pin two is transmit data and pin three is receive data. Therefore, the data transmitted by device A should be connected to the receive lines of device B, which means that these lines must often be crossed. There are three methods for determining the placement of the pins. First, consult the documentation, if pin two on both devices is transmit data, lines two and three may have to be crossed. The second method involves trial and error. Since there are only two possible combinations, if everything else is working correctly, alternating the placement should be an easy way to find which pin goes where. The last method involves the use of a tool specifically designed to solve this problem: the breakout box. Plug the breakout box into the circuit and manipulate the switches and jumpers until the indicator LED lights up for both lines two and three.

Handshaking. Aside from the ground lines, the signal lines are often the only requirement for the RS-232C interface. In other words, a cable can be constructed with only lines two, three and seven connected (and frequently is). Many devices have requirements beyond this two wire interface. Modems often require that the device connected to it show that is connected by bringing DSR (Data Set Ready) active. Active means about +12 volts. After the modem knows that there is something connected to it, it will try to establish communications with another modem over a phone line. When this happens, the modem will bring the CD (Character Detect) line active and the device will know that is is OK to transmit and receive data over the modem link.



As a more specific example, let's say we have a computer connected to a modem and that line two is transmit data on the computer and line two is receive data on the modem, and they are connected. By the same token, line three is transmit data on the modem and line three is receive data on the computer. When the wall power is turned on to both devices, the computer causes line twenty (DSR) to become active. DSR on the modem end is line six. When we connect line twenty on the computer to line six on the

modem, the modem knows that the computer is connected.

When the modem sets up a carrier detect link, it raises line eight to an active state. Line eight on the modem is connected to line eight on the computer and lets the computer know that the phone connection is valid. A valid modem-computer link is now made.

Another case might involve a modem and a terminal. In this case, both the terminal and the modem use line two as transmit data, and both use line three as receive data. These lines

Serial Connection

must be cross connected. Pin eight is connected on the modem to pin eight on the terminal, so that the terminal knows when the modem has established the character detect. The modem still needs an input on line six to know when the terminal is ready.

Our last example deals with the 202 standard half duplex modem, which needs the handshaking lines to change anytime data is sent in either direction. Before a terminal can send data over this modem it must first bring Request To Send (RTS line four) to the active state. If the modem is ready, it will respond by bringing Clear To Send (CTS line five) high. When the terminal senses line five as being high, it will send data. The 202 modem is the only 1200 baud modem that sells for under \$190.00. It is suitable for 80% of the functions done by the \$600.00 Bell 212 modem, usually requiring only a more complex cable to perform correctly.

The cable that works in the largest number of applications is a direct connect cable. A direct connect cable has lines one through eight and twenty on device A connected straight across to the same pins on device B. This should be the first cable the user should try.

DATA PROTOCOL

The data sent over the RS-232C consists of a stream of bits that, when assembled, produce a character. The amount of bits sent per character, the speed they are sent, and a few other factors make up the elements of the data protocol. These factors are baud rate, character framing, and parity.

Baud Rate: The baud rate is loosely defined as the amount of bits interchanged on an interface during one second. Of the three characteristics mentioned above, baud rate is the easiest to configure, just set both devices to the same rate.

Parity: The parity of a character is the amount of odd or even bytes it contains. The character "space" 20 hex is represented in binary as: 11000000. Because there are an even amount of bits, the space is considered to be parity even. Another popular method of determining parity is to always set the parity bit to either zero or one. Whatever method is used, make sure that both devices are set for the same parity mode.

Framing: Framing refers to the amount of data bits used to make up a character. There are four different

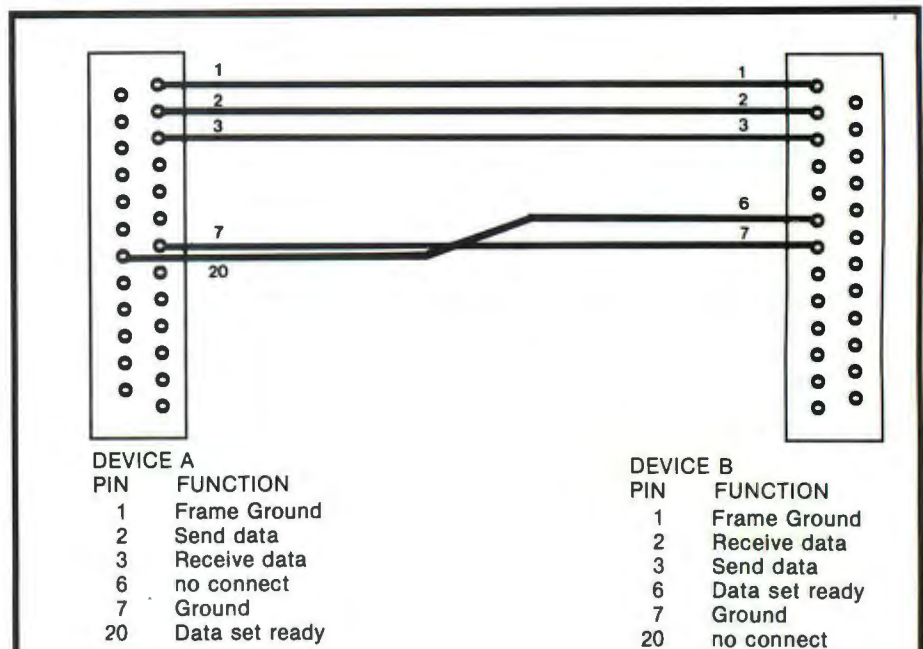


Figure C

The RS-232C interface often uses lines to indicate the readiness of a device to exchange information. In this example, the computer signals the modem that it is ready by bringing line twenty active. The modem's requirement is that line six be held high. Consequently, line twenty in the computer is connected to line six on the modem.

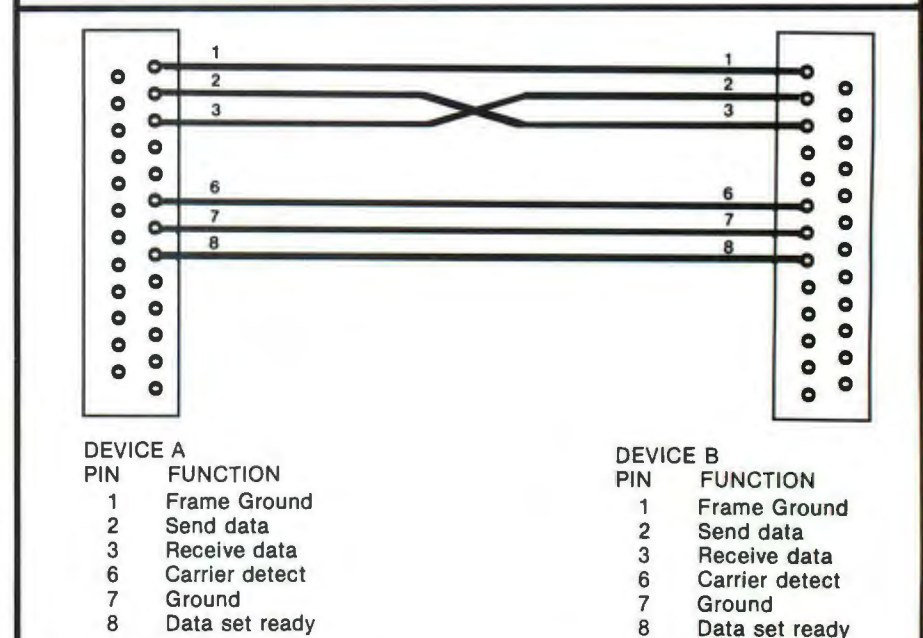


Figure D

Another modem interface involves two handshaking lines. The first line signals the modem that the terminal is ready, and the second signals the terminal that a carrier detect has been established by the modem.

types of bits used to make a character; start bits, stop bits, data bits and parity bits. Parity is covered in some detail in the previous paragraph.

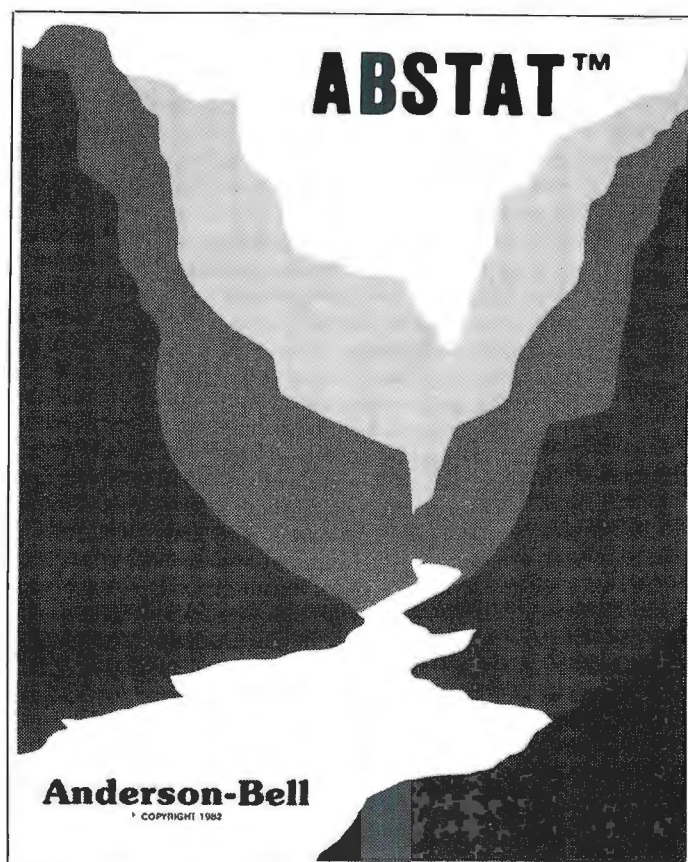
Start and stop bits are line normal areas that surround the actual data and enable the electronics on the receiving end to tell when a character

begins and ends. There is always one start bit and are one, one and one half, or two stop bits on the receiving end. With very few exceptions, setting the devices to one stop bit will work.

The amount of data bits used is machine dependent. Most machines, however, use eight data bits with bit

continued on page 74

**dBase II users can now evaluate their data
quickly and efficiently.**



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dBASE II USER'S FORUM

by George W. Fletcher

dBase II is a relational database management system with its own high level language, including relatively easy-to-use input, output, and query command structures. dBase II has broad appeal among business and professional people who have long had their eyes on their local minicomputer, wishing they could be more directly involved in the development of systems for their own use without changing careers. The idea of a user-designed and implemented relational data base application is truly revolutionary to those who have experienced the frustration of getting a minicomputer application from the wish list to a reasonably successful implementation. While there are practical limits to what can be accomplished with existing microcomputers, many small business applications fit easily within the constraints of dBase II. Whatever your intended application or current level of expertise with dBase II, this column will be directed specifically at your problems and interests.

The column will eventually emphasize reader contributed material. It will range from comments, problems, and practical application tips to complete columns submitted by users with experience in a particular area. Contributions, whether in the form of questions, answers, or commentary, should be accompanied by the following information:

- Your name (and, if applicable, the firm or organization you represent)
- Description of your computer, operating system, and the version of dBase II that you are using

Unless otherwise requested, significant contributions will be acknowledged and original material will become the property of CP/M REVIEW. Technical solutions will be verified prior to publication. In the case of duplication or very similar con-

tributions, the material first received will be acknowledged. Whatever your interests or level of experience with dBase II, please let us hear from you.

INTRODUCTION TO dBase II

To benefit readers who are not familiar with dBase II, or who have had little exposure to the area of data management, the following is a brief introduction to both.

Used to describe everything from a simple file management system to a multi-user, public access information bank, the term "database" is probably more useful in marketing than in data processing. Through overuse and misuse, the word has lost much of its value. As used here, a database refers to a collection of data files designed specifically to be shared by two or more users or independent programs. Add the term "relational" and you are referring to a DATABASE MANAGEMENT SYSTEM (DMS) which permits the user to directly access related information across file boundaries using shared data characteristics, or KEYS, inherent in the file structures. Such a system generally stands between the user and the database, invisibly performing the tedious file operations called for in a relatively brief command language. It also maintains the essential technical uniformity required to allow a set of files to be used as a database. Applications which use a relational DMS are characteristically flexible and responsive to user requests for information. Widely used on larger computers, there are just a handful of such systems currently available for microcomputers. Excellent comparative reviews of these have appeared in a number of computer magazines and are worth reading, even if you have already acquired dBase II or one of the other management systems.

George Fletcher, CPA, Assistant Controller of Whitney-Fidalgo Seafood, Inc. in Seattle, Washington is involved in financial modeling. He is also using dBASE II to develop accounting applications.

dBASE II REFERENCE CARD

dBASE II REFERENCE CARD

CREATE A DATABASE

CREATE

Allows you to create the structure of a database by answering a series of simple questions.

COPY [fieldlist] TO [filename] FOR [condition]

Copies desired fields to named database for records meeting the desired condition.

COPY STRUCTURE TO [filename]

Copies structure of database to named database.

ADD RECORDS TO A DATABASE

APPEND

Adds record to the end of database. Presents full screen display for you to fill in desired information.

APPEND BLANK

Adds a blank record to the end of the database.

APPEND FROM [filename] FOR [condition]

Adds records from named database that meet desired condition.

INSERT [BEFORE]

Same as append except that the record is added at the current position in the database.

CHANGING A DATABASE

EDIT [record number]

Allows full screen editing of desired record.

CHANGE

Allows change of named fields.

BROWSE

Allows full screen display and editing of several records for named fields.

REPLACE [fieldname] WITH [new data] FOR [condition]

Replaces named field content with desired new data for records meeting the desired condition.

MODIFY STRUCTURE

Allows changing the structure of a database. Destroys all data records.

@ line,col GET [Fieldname]

Used with read command to change content of displayed field.

READ

Used with GET command to provide screen editing of displayed data field.

DELETE FOR [condition]

Marks desired records for removal.

PACK

Removes all records marked for removal.

EXTRACTING INFORMATION

DISPLAY [fieldlist] FOR [condition]

Displays data records meeting desired condition.

DISPLAY STRUCTURE

Displays database structure.

DISPLAY MEMORY

Display memory variables.

LIST [fieldlist] FOR [condition]

Displays data records meeting desired condition.

? [fieldlist],[memory variable list]

Displays named items for current data record.

SUM [fieldlist] FOR [condition] TO [memory variable names]

Adds contents of named fields meeting desired condition and stores the results in the named memory variables.

COUNT FOR [condition] TO [memory variable name]

Counts records meeting desired condition and stores the result in the named memory variable.

REPORT [to print] FOR [condition]

Prepares report based on database contents for records meeting the desired condition.

@ line,col SAY [fieldname] GET [fieldname]

Displays contents of named fields at specified location on CRT for current record.

LOCATE INFORMATION

LOCATE FOR [condition]

Positions Database to first record meeting condition

CONTINUE

Positions Database to next record meeting condition

FIND [desired data]

Positions Database to first record matching desired data.

POSITIONING THE DATABASE

GO TO [record number]

Positions the database to desired record number.

SKIP [n]

Positions the database n records from the current record. n may be a negative number.

USING SCRATCHPAD MEMORY (memory variables)

STORE [data item] TO [memory variable name]

Stores desired data item to be named memory variable

ACCEPT ["screen display"] TO [memory variable name]

Displays screen display text as prompt to enter desired character data to named memory variable

INPUT ["screen display"] TO [memory variable name]

Displays screen display text as prompt to enter desired numeric data to named memory variable.

CHOOSING A DATABASE

USE [filename]

Closes current database (if any) and opens the named database file.

SELECT PRIMARY

Selects the database file identified as primary

SELECT SECONDARY

Selects the database file identified as secondary

IDENTIFICATION OF PRIMARY AND SECONDARY FILES

USE [filename 1]

Closes current database and opens the named database.

SELECT SECONDARY

USE [filename 2]

Allows you to open a second file — denoted secondary.

SELECT PRIMARY

Returns you to primary file.

CONDITIONS

Conditions are equations involving the fieldnames and field contents.

FIELDNAME=FIELD CONTENT

Conditions may be extended by use of Boolean Operators:

AND.
OR.
NOT.

FIELDNAME 1=FIELD 1 CONTENTS.AND. FIELD 2 = FIELD 2 CONTENTS

dBase II COMMAND STRUCTURES

There are several words in the dBASE command structure which have specific meaning in the context of the system, but which also stand for some of the more basic elements of the data base design. The most important of these are FILE, RECORD, FIELD, SORT, KEY, and INDEX. These are the terms in which you define your data base. Almost everything else in the user's manual refers to the means by which the data is entered, manipulated, queried, or summarized. The remarkable aspect of these six words in the context of dBase II, is how little one needs to know, technically, about what they mean. While the terms are to a degree self-explanatory, they are so central to the system that they warrant specific definition and explanation for the non-programmer who is just getting started.

A FILE is a set of records, organized on your disk (or tape) in a manner defined by the requirements of your operating system (i.e., CP/M). Users of word processors and electronic spreadsheets are familiar with the use of files for storing their work, but the actual structure of the files used has not been an issue. In a data management project, file structure IS the issue—in a certain sense, everything else is secondary.

In dBase II, file structure refers to the pre-defined elements of the RECORDS in each data base file. Data base RECORDS are sets of related FIELDS. Fields may be thought of as the terms in which you would classify the objects of your data base records, whether your purpose be to segregate (name, address, invoice number, etc.) or summarize (part number, account, flavor, etc.). dBase II records are defined in very simple terms. The only technical considerations are the length, type, and number of fields. Many elementary applications can be designed simply as an image of the source documents from which the data base information is drawn. Used in this way, dBase II may not differ significantly from the many file management packages available. The power of dBase II lies in the ability to build pathways through a number of files based on shared characteristics, or KEY relationships. By defining records appropriately, the user of a relational data base management system can produce an application which is far more flexible and efficient than that which can be achieved using

traditional file management methods. Relationships established in one data base file, generally need not be duplicated in other files, since all applications (or subsystems) can share all files. Data characteristics defined in one file can be used to find, display, and operate on records in other files. Even separate FILES, sub-routines, and commands may be related in this way.

One of the most attractive features of dBase II is the ability to change the structure of an existing data base file without having to re-enter the data. With a very simple series of commands, one can add, delete, expand, or contract fields. It is equally easy to combine, split, or extract parts of data base files. This flexibility is very comforting to the novice or the user who wants to pound out a relatively informal system for storing and analyzing large amounts of data. For the serious designer of formal, menu-driven data base systems, it is best not to rely too heavily on this ability to restructure the files, but it does reduce the stress experienced in the planning stages to know that one's design is not cast entirely in concrete.

Sorted output is one of the main objectives of almost any file management program. dBase II has its own SORT command with which the user can physically sort a file on a selected KEY field. What the manual does not emphasize strongly enough is that most users should never find the need for using this command. In fact, sorting files is not something that dBase II does very efficiently.

While it is true that sorting can be accomplished much more quickly with one of several sorting utilities available for CP/M systems, the elegance of a relational data base application lies in the fact that files are generally INDEXED. A new index can dynamically be created when needed. In addition, its order may be specified for ascending or descending sequence. The language used to describe this concept and the technical demands on the programmer vary considerably between software packages. The basic idea however, is surprisingly simple. Indexing is so important that one should understand it clearly before embarking on any major relational data base management project, whether the host system be dBase II or not.

Instead of sorting an entire file, a relational data base management

system builds INDEX files containing only KEYS made up of fields (or parts of fields), which define the searching and sorting order of interest to the user — plus pointers to the master data base records. In dBase II, indexing is much faster than sorting, and one index file can be maintained automatically for each data base file. When there is a need for multiple indexes, the time required for re-indexing is one of the things the designer should consider in planning an optimal data base design. Finding a specific record or producing sorted output by means of index files is much more efficient than sorting and searching through the main data files. This is partly due to certain technical aspects in the way dBase II uses index files, and partly due to the fact that only the KEY elements of the data base are contained in the INDEX file.

dBase II does a remarkable job of capturing the advantages inherent in a relational data base management system with a flexible and uncomplicated command structure. The system is not so simple as to be unduly restrictive, nor so complex that it stifles the creativity of the non-technical user. With dBase II acting as an intermediary between the user/programmer and the files, the really technical details are handled automatically. Design of a data management system is simplified by the fact that data base files are independent of the programs (or direct query operations) used to enter or access the data. All fields in all data base files are accessible. The user need not be concerned with the ordering of the fields within a record, or records within a file. The fact that a file may contain fields not requested by the user is of no concern to either the user or to the system. Fields may be added or deleted from the file structure without affecting the operation of existing programs. Sets of files comprising an overall data base can be used for any number of independent applications. The duplication required by other types of file management methods is largely eliminated by the ability to use two data base files simultaneously, and by the fact that any number of indexes may be built without affecting the master data files. Most importantly, the time required to find selected information is a fraction of that required by typical file management programs. Currently limited to single user

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THE MICROCOMPUTER ALTERNATIVE

by Deryk Van Brunt, Julian Henkin, and Ross Charney

Making a big computer act like a small one may seem paradoxical, but the resulting access to an extensive, cost-effective software library makes it appealing.

During the last five years, CP/M has evolved into the standard operating system for personal computers. With an annual growth rate in numbers of over 25 percent and an installed base of over 500,000 microcomputers, the CP/M marketplace becomes a tempting target for the authors of application programs. The large and growing number of microcomputers has allowed CP/M authors to charge between 5 and 25 times less for their software than their counterparts written for the minicomputer marketplace. Other comparisons

turers and users to employ the CP/M operating system.

The Bridge can replace the need for stand-alone microcomputers. In mid-1981, a speech synthesis research company based in Berkeley, California, required for a project, a standard project management/critical path program. Such software costs between \$5,000 and \$15,000 for minicomputers. The CP/M program MILESTONE, which retailed for under \$300, fit their requirement completely. They were not, however, willing to trade the convenience of high quality, reliable peripherals, remote access control, and multi-user capability for a personal computer. At this time, this CP/M compatibility need spurred the development of The Bridge, the Vir-

"... there is the option to transfer files and programs in the CP/M environment or to use the micro as a terminal online to the mini."

reveal that because many personal computer users often have little technical background, CP/M software usually is more user-friendly than minicomputer software. This ease of use reduces training costs. The large CP/M marketplace has also permitted authors to develop profitably, a wide range of specific application programs. Consequently, over 2,000 CP/M packages exist. Finally, we note that the documentation for CP/M programs benefits from exhaustive field testing. Many such packages contain meaningful reference cards and tutorial sections to make the average CP/M program more clear than many non-CP/M counterparts. The availability of this inexpensive, user-friendly, creative, well-documented software has further stimulated microcomputer manufac-

tual Microcomputer System. Bridges currently exist for the DEC and Data General minicomputers, with others to follow in the months to come.

In developing The Bridge, Virtual Microsystems, Inc. (VMI) held the philosophy that the end-user would only have to know about CP/M in order to operate The Bridge task. Consequently, of the many avenues possible in developing a CP/M providing product, it was decided that The Bridge would simulate an 8080 on the appropriate host minicomputer system. Rather than reinvent the wheel, The Bridge runs a modified, licensed copy of Digital Research's CP/M on the CPU of the minicomputer. In order to execute application programs, it was also necessary to simulate the standard CP/M style

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CUSTOM I/O ROUTINES FOR PIP

by Mike Karas

Any number of special applications exists for custom hardware I/O routines for use under the CP/M operating system to input data or to send output data to physical devices that are not supported by the users CP/M Custom Basic I/O System (BIOS). The possibilities range from simple immediate one shot special requirements to those where I/O must be implemented on a system where the source code for the BIOS is not available. Digital Research has provided an easy-to-implement custom I/O module capability within the PIP.COM utility. With this capability, input to a special device may be referenced with the INP: physical device name. Likewise, output may be sent to a custom physical device with reference to the OUT: physical device name.

A typical application for such a procedure came to my attention recently. The problem was how to get the default standard public domain MODEM source program up and running on a new OSBORNE computer. Note that its 5¼" diskette media is not known to be compatible with other systems. Also, another machine with software up and running was not MODEM.ASM source code. That could take a long time. I suggested hooking up the RS-232 port of the OSBORNE to an RS-232 port on a machine that had the source for MODEM available. Assuming that the hardware problem is not an insurmountable hurdle, then the "immediate" mode patching of PIP.COM on the OSBORNE with DDT.COM could make the loading of MODEM into the OSBORNE with a simple command like:

```
A>PIP MODEM.ASM=INP:[B]<CR>
```

The [B] being used to buffer the source in memory to alleviate the need to perform hardware handshaking between the computers.

The example implementation of this capability shown here, interfaces the 8251 USART on a Monolithic Systems MSC-8009A multibus Z80 board with the INP: and OUT: references. It is presented purely as an example and should not limit your imagination as to how you may get a special interface working on your machine.

A quick look at PIP.COM with DDT as shown below illustrates the patch area and INP: and OUT: interface scheme:

```
A>ddt pip.com <cr>
```

```
DDT VERS 2.2
```

```
NEXT PC
```

```
1E00 0100
```

```
-d100,23F<cr>
```

```
0100 C3 CE 04 C9 00 00 C9 00 00 1A 00 00 00 00 00....
```

```
0110 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
```

```
0120 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
```

```
.....AND SO ON AND SO ON.....
```

(Note that all of the space from 010AH to 01FFH is available for patch area.)

```
01D0 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
```

```
01E0 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
```

```
01F0 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
```

```
0200 20 20 20 43 4F 50 59 52 49 47 48 54 20 28 43 29
COPYRIGHT(C)
```

```
0210 20 31 39 37 39 2C 20 44 49 47 49 54 41 4C 20 52
1979,DIGITAL R
```

```
0220 45 53 45 41 52 43 48 2C 20 20 50 49 50 20 56 45
ESEARCH, PIP VE
```

```
0230 52 53 20 31 2E 35 03 01 06 01 00 24 24 24 20 20
RS 1.5.....$$$
```

```
-1100 <cr>
```

```
0100 JMP 04CE -- Make note of this address and set
equate "pipentry" in the patch
file to this value.
```

```
0103 RET <-- Pip call point for INP:
```

```
0104 NOP
```

```
0105 NOP
```

```
0106 RET <-- Pip call point for OUT:
```

```
0107 NOP
```

```
0108 NOP
```

```
0109 LDAX D <-- Pip expects INP: characters here
with parity stripped
```

```
010A NOP
```

```
010B NOP
```

```
010C NOP
```

This example shows the PIP patching procedure by entering the source code for custom I/O drivers as an assembly source file. This file is then assembled into a ".HEX" file. The program listing below shows the MCS 8009A serial port patching example. Note that the equate

"Custom I/O Routines for PIP", by Mike Karas, appears courtesy of the Valley Computer Club NL, and the Amateur Computer Group of New Jersey.

"PIENTRY" in the file must be set to the address presently at locations 0101H and 0102H in your version of PIP. The example shown is fully compatible with the PIP programs supplied with both CP/M version 1.4 and 2.2.

```

; .....
; DIRECT PIP I/O PATCH PROGRAM FOR PIP 1.4 AND PIP
; 2.2 INP: AND OUT:
; .....
; THIS PATCH FILE IS USED TO OVERLAY THE FIRST PORT
; OF THE DIGITAL RESEARCH "PIP.COM" FILE TO
; PERMIT BUILT-IN PIP PHYSICAL DEVICE REFERENCE
; NAMES "INP:" AND "OUT:" TO BE USED. THE ENTRY
; INFORMATION IS AS FOLLOWS:
; A) INITIAL EXECUTION ENTRY OF PIP FROM ADDRESS
; 0100H PASSES CONTROL INITIALLY TO AN INITIAL-
; IZATION ROUTINE TO INITIALIZE THE CUSTOM I/O
; DEVICE(S). COMPLETION ON INITIALIZATION PUTS
; CONTROL TO THE NORMAL PIP ENTRY POINT.
; B) IF PIP.COM IS CALLED WITH A COMMAND LINE LIKE
; A>PIP FILENAME.TYP=INP:<CR>
; PIP WILL EXPECT INPUT FROM AN I/O ROUTINE
; PATCHED INTO PIP.COM BY CALLING I/O ROUTINE
; ENTRY POINT AT ADDRESS 0103H. THE INPUT CHAR-
; ACTER IS PASSED BACK TO PIP IN LOCATION 0109H
; PARITY MUST BE STRIPPED FROM INPUT CHARACTERS
; C) IF PIP.COM IS CALLED WITH A COMMAND LINE LIKE
; A>PIP OUT:=FILENAME.TYP<CR> ****
; PIP WILL SEND OUTPUT TO ROUTINE PATCHED INTO
; PIP.COM BY CALLING I/O ROUTINE ENTRY AT 0106H
; THE OUTPUT CHARACTER IS PASSED FROM PIP IN
; THE<C>REGISTER.
; THIS DEMONSTRATION VERSION OF CUSTOM PIP PATCH-
; ING ASSUMES THAT IT IS DESIRED TO PATCH PIP TO
; UTILIZE THE SECOND SERIAL I/O PORT OF A MONO-
; LYTHIC MSC-8009A Z80 CPU CARD. THIS PORT IS AN
; 8251A USART WITH BAUD RATE CONTROLLED BY ONE OF
; THE COUNTERS IN AN 8253 CHIP. THE OPERATION HERE
; DEMONSTRATES USE OF THE PORT FOR BOTH INPUT AND
; OUTPUT FUNCTIONS. IT IS INITIALIZED TO 300 BAUD,
; 8 BITS NO PARITY, AND ONE STOP BIT.
; .....
; MSC 8009A SECOND SERIAL CUSTOM PORT CONFIGURAT.
; RS232 PORT EQUATES TO MSC 8009 Z80 BOARD
CTRL EQU 0CFH ;CUSTOM 8251A CONTROL PORT
CSTAT EQU 0CFH ;CUSTOM 8251A STATUS PORT
CDATA EQU 0CEH ;CUSTOM 8251A DATA PORT
TCC EQU 0DFH ;CUSTOM 8253 TIMER CTRL PORT
TCR EQU 0DDH ;CUSTOM 8253 TIMER REG. PORT
TCCW EQU 076H ;CUSTOM 8253 TIMER CTRL WORD
SRRDY EQU 002H ;8251A REC. CHAR. READY MASK
SRVAL EQU 002H ;8251A RECEIVER READY VALUE
STRDY EQU 001H ;8251A XMITER EMPTY READY MASK
STVAL EQU 001H ;8251A TRANSMITTER READY VALUE
INITC1 EQU 040H ;8251A INITIALIZATION....
INITC2 EQU 04EH ;...
INITC3 EQU 037H ;... ALL THREE OF 'EM
DCBR EQU 416 ;DEFAULT FOR CUST. PRT @ 300 BAUD
;SET PIP JUMP ADDRESS FROM YOUR COPY OF PIP.COM AS
;VIEWED BY DDT.COM AT ADDRESS 0100H. THE FOLLOWING
;EQUATE IS SET TO THE JUMP ADDRESS FROM LOCATION
;0102H/0103H.
PIENTRY EQU 0000H ;SET BEFORE ASSEMBLY
;ESTABLISH ENTRY POINTS FOR OVERLAY OF PIP.COM
;PATCH FILE.

```

```

ORG 0100H ;BEGINNING OF PIP.COM
JMP INITIALIZE ;GO HANDLE INITIALIZATION
; OF SIO
JMP CI ;CUSTOM INPUT PORT ENTRY LOC.
JMP CO ;CUSTOM OUTPUT PRT ENTRY LOC.

RETCHAR:
    DB 01AH ;PIP INPUT RETURN CHAR. LOC.
;HERE TO SETUP OUR SERIAL PORTS AND THEN PASS CNTRL
;DOWN INTO PIP.COM
;
INITIALIZE:
    CALL SINIT ;SUBROUTINE TO INITIALIZE
;USART AND TIMER.
    JMP PIPENTRY ;OFF TO PIP

;CUSTOM SERIAL I/O INITIALIZATION ROUTINE
;
SINIT:
;SETUP TIMER COUNTER CHIP FOR BAUD RATE CLOCKS
;
LXI H,DCBR ;GET CUSTOM PORT BAUD RATE CODE
MVI A,TCCW ;GET CUST. PORT TIMER MODE WORD
OUT TCC ;SEND IT TO TIMER
MOV A,L ;GET LSB'S OF BAUD RATE CONSTANT
OUT TCR ;SEND
MOV A,H ;HIGH BYTE
OUT TCR ;SEND THAT ALSO
;INITIALIZE THE 8251A WITH TRIED AND TRUE METHOD
;
MVI B,020 ;LOOP COUNT
XRA A ;NULL

INITLP:
    OUT CTRL ;RESET 8251A'S ...
    DCR B
    JNZ INITLP ;TILL THEY'RE GOOD AND DEAD
    MVI A,INITC1 ;SEND THREE .....
    OUT CTRL ;...INITIALIZATION CHARACTERS...
    MVI A,INITC2 ;...TO 8251A'S
    OUT CTRL
    MVI A,INITC3
    OUT CTRL
    IN CDATA ;PURGE UART GARBAGE
    IN CDATA
    RET ;FINALLY DONE WITH ALL THAT
;CUSTOM PORT INPUT ROUTINE
; GETS CHAR TO PIP RETURN LOCATION AT (0109H)
CI:
    IN CSTAT ;GET READY STATUS
    ANI SRRDY ;MASK RECEIVER READY
    CPI SRVAL ;COMPARE WITH READY VALUE
    JNZ CI ;REPEAT TILL INPUT READY
    IN CDATA ;GET INPUT IF READY
    ANI 07FH ;STRIP PARITY
    STA RETCHAR ;PUT INTO PIP RETURN LOCATION
    RET
;CUSTOM PORT OUTPUT ROUTINE
; SENDS CHAR IN <C> REGISTER
;
CO:

```

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THIRD WAVE

The following is an interview with Alvin Toffler by Mark Savan, as heard on KVI Radio in Seattle, Washington.

Mr. Toffler is the author of FUTURE SHOCK and THE THIRD WAVE.

The first wave is the agrarian era. The second wave is the industrial revolution, and now we are in the third wave. There is a conflict between groups. Economic and political interest in the second wave are at contrast to the new groups springing up around the third wave.

In the first wave we had democratic government. People sat around in their communities and wherever a decision needed to be made, everybody got together and made the decision. In the second wave, we needed representative government because there were too many people for democracy and we didn't have the kind of communication required for democracy with large numbers of people, so representative forms of government worked.

you an example of that. We have been separating work from home. By putting work into factories and offices, we have created the need for commuting.

So in the United States every morning, tens of millions of people get into their cars and they go to work. That commuting system is at the break point. People are sitting bumper to bumper behind one another. The cost of gasoline is going through the sky. The cost of wasted energy, wasted time, wasted production is horrendous. By the time you get to work, you don't feel like working. The cost in terms of pollution and all kinds of hidden costs has reached the point of being almost intolerable. There's no way we can expand our highways, our mass transit systems, and all the rest to handle it.

Simultaneously, there is a crisis in

"It's going to be a lot cheaper for the company to give you a simple terminal that you can take home. . ."

Toffler: I don't think anybody knows the future. I think anyone who claims to know the future should be handled with caution. That doesn't mean we can't think sensibly about the future. We can look at what's happening today and at what has happened and create some assumptions in our minds, some models. We can analyze the main forces acting on us and from that draw some inferences about the future.

Savan: You call the third wave home "the electronic cottage."

Toffler: History is funny. It creates a crisis and at the very same time it very often provides the means for resolving the crisis. But in order for us to recognize that we've got to think outside the normal frames. Let me give

the energy system and a crisis in the ecological system. So we see a whole set of crises coming at the very same time. But at the moment at which the system has reached the breaking point, we also develop new ways of coping. For example, as the cost of energy rises, the cost of computers and cost of communication goes down. It becomes possible for more and more people to actually work at home. They may not have to commute at all or, maybe go to work two days a week instead of five and work at home three days. We're going to see an increasing shift from home and office to either decentralized work locations or directly into the home. With people able to do many things they now do in the office using cheap simple keyboards and

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even speech recognition devices. Video equipment and so forth. It's going to be a lot cheaper for the company to give you a simple terminal that you can use at home and make that investment once, than to keep paying you, giving you raises just to cover the rising cost of gasoline.

Savan: *When I was a kid, no store was open after six o'clock on Sundays.*

Toffler: In the third wave you see what we're looking toward is a fundamental change in the way we use time. In the second period, everybody was supposed to be synchronized. Get up at the same time, commute at the same time, work at the same time, watch TV at the same time, go to bed at the same time. Now we're seeing more and more flextime. People able to choose their hours to a certain degree, more and more stores kept open around the clock so that you can shop any hour convenient for you, 24 hour banking. Instead of people being all synchronized in unison with one another as a mass system, we are now personalizing their schedules and the society is no longer synchronized in the same way. It is no longer possible for the networks to say, if you want to see my show you've got to see it at 9:00, because I can say nuts to you. I can record it and see it at 11:00 tomorrow if I want.

Savan: *There are already places in this country where traditional rush hour traffic is thinning.*

Toffler: Yes, I think that's true. Another clue about the differences between a third wave and a second wave community is reflected in the traffic patterns. If I'm in a town and all the traffic is moving one way in the morning and back the other way at evening, that tells me that the town has a second wave economy and a second wave industrial base. Where the traffic is going in all directions both morning and night, rather than concentrated in a linear flow; where the peaks no longer are as sharp as they used to be, you have an economy that's moving toward third wave.

Savan: *You say no corporation president would try to run a table of organization first sketched by the quill pen of some 18th century ancestor whose managerial experience consisted of running a farm.*

Toffler: That's exactly what we're doing though, politically. We are trying to govern ourselves with institu-

tions that were designed for an agrarian age or for a very early industrial age. They were essentially designed to govern a people who were largely illiterate, small populations, and with no contact or limited contact with other countries. A society in which messages moved very, very slowly so it might take three weeks or three months for news to get from Philadelphia to Ohio; a society in which the conditions were radically different from those of today. As a result, our political society is increasingly obsolete and that is exactly true of the British, the French, the Germans, the Japanese, and even more so of the Soviets and the communist countries.

Savan: *We are now getting back to a point in third wave society where the true democracy might be a better form of government than representative forms.*

Toffler: Well, what's happening is that representative governments are overloaded, and because they are overloaded they don't have the wherewithal to function. Governments have to make decisions. As a society has gotten more complicated: as the issues have become more complex; as communication has gotten faster; as the need for decisions has accelerated, the government agencies and legislative bodies are drowning in information that they can't digest.

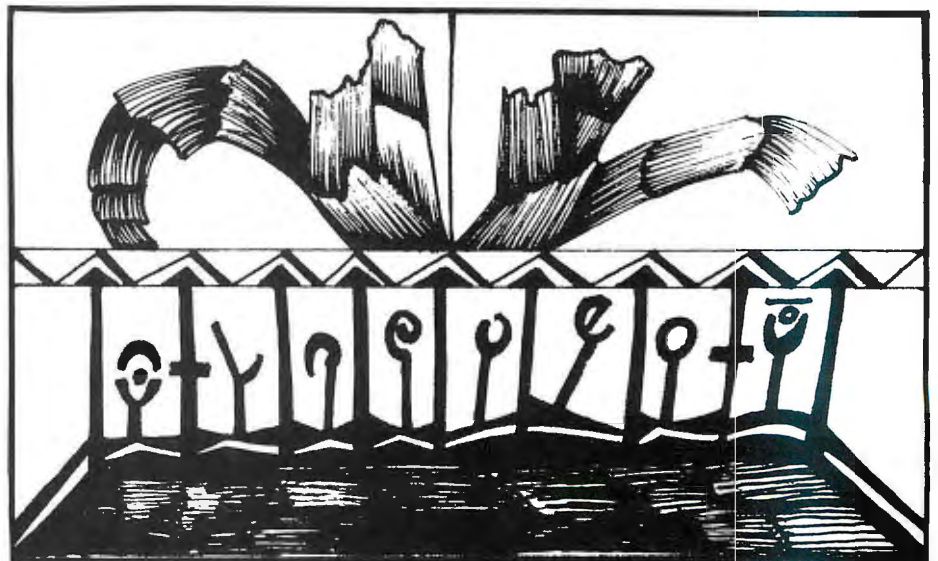
At the same time, they are ignorant about the effects of their behavior out in the localities. As a

result, these governments are making more and more decisions that are more and more incompetent. And it is not a function of how smart the president is, or what a nice guy he is or the prime minister or the secretary of the party of what have you. The issue isn't the individual, it's the institution.

The political decision-making institutions in all these countries are simply drowning in indigestible information and therefore they are going to make bigger and bigger mistakes. We are going to have to do some creative inventing of new political institutions over the next 20, 30 years if we're going to survive with anything that remotely resembles a democracy, and among the things we are going to look at is the way in which communications tools might help us.

Savan: *One thing you don't cover in the THIRD WAVE is the why of it. Why is the third wave occurring?*

Toffler: What causes the third wave is everything changing. Nothing has a single cause. Particularly something as gigantic as a civilization upheaval. If I look at history, the really big changes result as a flowing together of multiple forces. And in our world we're seeing radical changes in the resource base and the energy picture. A radical change in the relationship between the poor countries and the rich countries; radical changes in our technological bases; changes in communication; all of these things converging.



VIDEOTEX

Pels, primitives, and protocols . . .
an introduction to the technology
of a new information system

by Errol Smith

For thirty years television has been an entertainment media. It hasn't lived up to its real potential of providing educational material to the home or information to help productivity in business and industry. The seeds of the long awaited *information revolution* are being quietly planted in Western Europe, Canada, and the United States, in the form of a new information service. This service goes under the various names of Videotex, Teletex, Prestel, Teledon, and so on; however, they all have a few important properties in common:

- instant access to large data bases
- the ability to interact with the system in the selection of which data to view
- data is displayed on a modified home television
- the display image is digitally encoded in a series of ASCII characters.

The rate of growth of Videotex depends on these three interest groups progressing simultaneously:

- the "providers" of information: publishers, newspapers, schools, libraries, financial institutions, etc.
- the "technologists": manufacturers of TVs, computers, LSI chips, etc.
- the "users" who require and make use of the data.

However, at this time the real pacing item is the lack of a standard protocol. The providers are reluctant to encode millions of characters of data into a format that will not be accepted, the electronics manufacturers cannot afford to commit chips to a limited market, and the users don't want to invest in expensive color TVs with custom decode electronics that may become obsolete. In the United States, it appears that the standard protocol problem will be solved to everyone's

satisfaction soon. For a change, the U. S. is letting the rest of the world be the technological "pioneers" and take a few arrows in the form of expensive mistakes. The U. S. has been holding back while developmental systems were being tested in Great Britain (Prestel) and Canada (Teledon). Other systems are being tested in Germany, France, and Japan. In Great Britain, for example, broadcasting and communications are nationalized, so they can begin experiments that no private corporation would undertake. Canada, in turn, improved upon the Prestel system by adding a better graphics capability, while maintaining compatibility and announced the Teledon System. This is now where the United States has stepped in. AT&T picked up the Teledon Standard, made some enhancements, and has proposed a North American Standard which they have named Videotex. The proposed standard is being studied by ANSI and is expected to be adopted in a matter of months. The adoption of a worldwide standard seems out of the question. Europe alone is a living monument to non-standardization, with its languages, monetary systems, and railroad tracks that don't match.

Even if Videotex is adopted as the U. S. standard, total standardization in this field is probably not possible. Many private systems will flourish due to the sheer magnitude of the potential market.

Several corporations are not waiting for the full standard, and are proceeding with partial implementations for applications that do not require full graphics capabilities. For instance, IBM has announced a Prestel-like system for the Series/1 that will be excellent for certain private applications.

In this first in a series of two articles, we are going to give an overview

INTRODUCTION TO VIDEOTEX

The standard is divided into two parts; a description of TEXT sets, including the ordinary alphanumeric characters, a MOSIAC set, a supplementary character set, and a Dynamically Redefinable Character Set (DRCS). The second part covers the Picture Description Instructions (PDI), which includes graphics primitives for generating points, lines, arcs, rectangles, and polygons.

All of the sets are defined by a predetermined pattern and maintained at the receiving device, except the DRCS which can be downloaded from the transmitting system. In most implementations the character patterns would be in Read Only Memory (ROM) except for the DRCS which would necessarily be loaded into RAM. Text

		b ₇ b ₆ b ₅	0	0	0	0	1	1	1	1
			0	0	1	1	0	0	1	1
			0	1	0	1	0	1	0	1
b ₄ b ₃ b ₂ b ₁ b ₀	COL ROW		0	1	2	3	4	5	6	7
00000	0			SPACE	0	"AT" SIGN	P	\	p	
00001	1			!	1	A	Q	a	q	
00010	2	CON COL	TROL UMNS	"	2	B	R	b	r	
00011	3			#	3	C	S	c	s	
00100	4			\$	4	D	T	d	t	
00101	5			%	5	E	U	e	u	
00110	6			&	6	F	V	f	v	
00111	7			'	7	G	W	g	w	
10000	8				8	H	X	h	x	
10001	9]	9	I	Y	i	y	
10010	10			*	:	J	Z	j	z	
10011	11			+	;	K	[k	{	
10100	12			,	<	L	\	l		
10101	13			-	=	M]	m	}	
10110	14			.	>	N	^	n	-	
10111	15			/	?	O	_	o	■	

Figure 1. Geometric layout

Picture Description Instructions (PDI). There are six graphics primitives; POINT, LINE, ARC, RECTANGLE, POLYGON and INCREMENTAL. Each has four forms and eight additional control codes not found in the standard control codes. The 96 character graphics set is further divided into a block of 16 PDI control characters and a block of 64 characters reserved for numeric parameters (see Figure 3). Unlike the

TEXT graphics, the PDIs require multibyte commands. Each PDI is made up of an op code (one of the characters in column 2 or 3 in Figure 3) followed by one or more bytes of numeric data, depending on the op code.

Positioning. The op codes are followed by positioning of coordinate data which is based on the concept of a "Unit Screen". The screen is assumed to have an (X,Y) coordinate system with the origin in the lower lefthand corner. The horizontal (X) and vertical (Y) coordinates range in value from 0 to 1. Note that the positioning is independent of the resolution of the receiving TV. The decode hardware/software positions to its nearest pel, consequently two systems with different video attributes can still display the same picture. The one with more capability will just do a better job; they will both present useful information.

Color Selection. Color is also normalized between 0 and 1. The intensity of the Green, Red and Blue are expressed from 0, indicating off, to 1, indicating full intensity. The theoretical limit on the number of colors is a function of the number of bits used to express RGB intensity. Of course, the actual limit is the quality of the video electronics and the video controller. Again, a system without a large color palette can "do the best it can" by interpreting the high ordered bit. This could be a little risky because some terrible color combinations could be generated. So rather than let the intensities range continuously, a color mapping can be performed. For instance, if a 4 bit address is used for positioning in the color map and 9 bits are used to specify intensity, then one can select up to 16 colors from a possible 512. The size of the color map and the number of colors are arbitrary. An example of such a color map is shown in Figure 4. The map in Figure 4 represents the capability of the current generation Canadian Teledon System manufactured by Electrohome. They are rumored to be developing a new generation system with an improved palette.

Blinking. When the control code for blinking is used, the pels to be blinked are overwritten by another color. The overwriting color and duration are specified in the op code.

				b ₇	0	0	0	0	1	1	1	1	1
				b ₆	0	0	1	0	1	0	0	1	1
				b ₅	0	1	0	1	0	1	0	1	1
				b ₄	0	1	0	1	0	1	0	1	1
				b ₃	0	1	0	1	0	1	0	1	1
				b ₂	0	1	0	1	0	1	0	1	1
				b ₁	0	1	0	1	0	1	0	1	1
				b ₀	0	1	0	1	0	1	0	1	1
				COL	0	1	2	3	4	5	6	7	
				ROW	0	1	2	3	4	5	6	7	
0	0	0	0	0									
0	0	0	1	1									
0	0	1	0	2									
0	0	1	1	3									
0	1	0	0	4									
0	1	0	1	5									
0	1	1	0	6									
0	1	1	1	7									
1	0	0	0	8									
1	0	0	1	9									
1	0	1	0	10									
1	0	1	1	11									
1	1	0	0	12									
1	1	0	1	13									
1	1	1	0	14									
1	1	1	1	15									

Figure 2. MOSIAC Set

Waiting. A control code for programming a delay is provided. It specifies a waiting increment in fractions of a second, and the number of increments to wait. This is probably for a limited animation capability.

Texture. The TEXTURE command allows for dotted lines, herringbone fills, etc., without having to painfully encode them at the pel level. Like the other aspects of Videotex, it is general enough to accommodate arbitrary dot, fill, and highlighting patterns.

Reset. The RESET command is used on a selective basis to reinitialize the control parameters back to their default values. It is used to perform tasks like HOME, clear the screen, clear the texture, unprotect fields etc.

THE GEOMETRIC PRIMITIVES

Points. The most primitive of the primitives is the POINT command. It is used to position a point from which a more complex primitive will commence drawing, or simply to draw a dot at a point. It is specified in ab-

					0	0	0	0	1	1	1	1
					0	0	1	1	0	0	1	1
					0	1	0	1	0	1	0	1
					0	1	2	3	4	5	6	7
bbbb 4321	COL ROW											
0000	0			P D I								
0001	1				R E C T							
0010	2	CON COL	TROL UMNS	C ONT ROL								
0011	3											
0100	4											
0101	5			P O I N T	P O L Y							
0110	6											
0111	7									NUMERIC DATA		
1000	8											
1001	9			L I N E	I N C R							
1010	10											
1011	11											
1100	12											
1101	13			A R C	C ONT ROL							
1110	14											
1111	15											

Figure 3. PDI Command Format

solute coordinates or relative to a previous point.

Lines. The LINE command is used to draw a straight line in the in-use color and texture from an initial starting point to a final point. The final point can be specified relative to the starting point or in absolute coordinates. The final drawing point becomes the starting point for the next PDI.

Arcs. The ARC command is used for circles, arcs, and spline curves (a con-

tinuous curve fit using a series of arcs with different diameters). Arcs are specified in a similar fashion to lines, with the addition of an intermediate point, which fixes an arc. When the final point is equal to the starting point a circle is drawn; if the intermediate point is on a line between the starting and final points, then a straight line is drawn. Texture and fills are supported. When filling an arc, a chord is assumed to exist between the end points.

Rectangles. The RECT command is used for drawing rectangles. The height and width are specified relative to the current starting point and can be filled and textured. Opposite sides cannot cross to form two triangles.

Polygons. A polygon is generated by specifying each vertex as an incremental X and Y from the previous point. They must close and can be filled and textured. Again, no crossing of sides is allowed.

Miscellaneous other features. Unprotected fields can be defined for local editing and input.

MACRO command sets can be given control code status, such as scrolling, common textures, underlining, protecting fields, additional cursor control etc. Downloading of alternate sets is supported.

Future enhancements. There are provisions in the code structure to accommodate future enhancements by extending the code.

In this brief overview we have omitted much of the tedious detail of the command formats, defaults and options. The reader wishing to study further can obtain a copy of the standard by contacting:

American Telephone & Telegraph
5 Wood Hollow Road
Parsippany, NJ 07054
Attn: Information Management Planning and Development.

COMMUNICATIONS AND SYSTEMS CONSIDERATIONS

The communications aspect of Videotex is the most complex and confusing issue of this technology. There are four promising ways to provide the service: (1) through the voice telephone system, using current analogue communications; (2) by broadcasting the signal over entertainment channels during the vertical blanking interval; (3) through the cable TV networks; and (4) via direct satellite reception. At this time, it is not clear which technique will be used where, because there are many unknown factors to be considered.

Some of the factors that will determine the delivery technology are: (1) the degree of interaction; (2) privacy; (3) cost; (4) market size; and more. This is one of the topics that will be covered in detail in Part II. We will touch briefly on some of the major issues here.

ADDRESS	RED	GREEN	BLUE
0000	000	000	000
0001	001	001	001
0010	010	010	010
0011	011	011	011
0100	100	100	100
0101	101	101	101
0110	110	110	110
0111	111	111	111
1000	000	000	111
1001	101	000	111
1010	111	000	100
1011	111	010	000
1100	111	111	000
1101	010	111	000
1110	000	111	000
1111	000	101	111

GREY
SCALE

COLOR
HUES

Figure 4. Color Mapping

Via the Telephone. Using the phone system offers the least technical challenge at the receiving end, while providing excellent interaction. Sending and receiving ASCII to a remote computer is well understood and proven, however, it does present many other problems:

- your phone is tied up while you are online
- if the supplier is to provide service to several thousand users, the communications front-end and operating system to do this efficiently may not exist today (the airline reservation systems using ACP are probably the closest).

- the local phone exchange may not be able to handle the load.
- transmission speed is limited by MODEM technology.

On the positive side:

- the phone system is in place and ready to go.
 - it provides the necessary privacy that certain applications such as banking must have.
 - unlike the other methods of Videotex delivery, you are not using the airwaves so government regulatory agencies are not in the act.
- There is no doubt that Videotex via the telephone will find many

markets. The over one million personal computer owners will want the capability and if they have graphics and a MODEM, all they need is a program to decode. There will be many high leverage applications where the value of the data far exceeds the long distance tolls, as in the case of stock market advisory services. Lastly, the phone system provides a good vehicle for test marketing and start-up operations.

Broadcasting Videotex. While you are viewing a local entertainment TV channel, there are small intervals of time that data can be mixed with analogue signals without disrupting the picture (it may cause trouble with your video recorder) called the vertical blanking intervals. In the course of 15 or 20 seconds, several thousand Videotex images can be transmitted and the station can recycle them over and over. In this case the, interaction

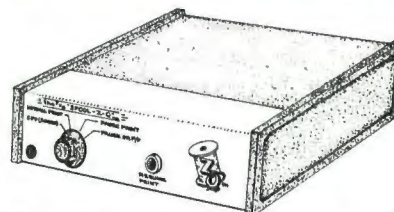
by the viewer is with his own TV. By keying an index his television can "watch" for a certain frame and "grab" it as it goes by. The amount of data is necessarily limited, and must be traded off against the inconvenience of waiting time. The station can solve the quantity of data problem by scheduling information blocks like they schedule entertainment; that is, news between 7:00 and 8:00, educational materials between 8:00 and 9:00, etc.

This form of Broadcast Videotex will be the first to serve mass markets. There are several ways to expand as the usage of this service builds. For example, dedicating entire UHV channels and interacting with the broadcast station using the phone system.

As the technology develops, cable, and ultimately direct satellite systems, can be introduced as compatible with different levels of interaction.

continued on page 74

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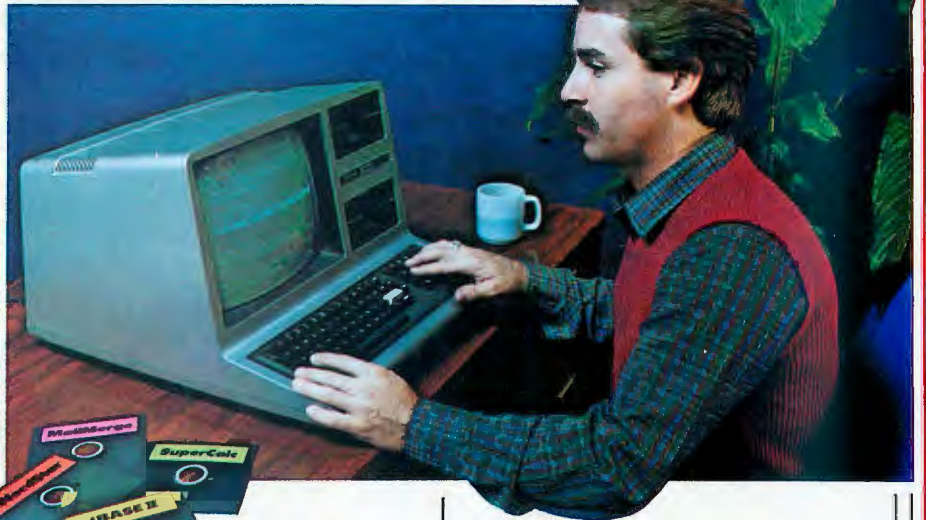
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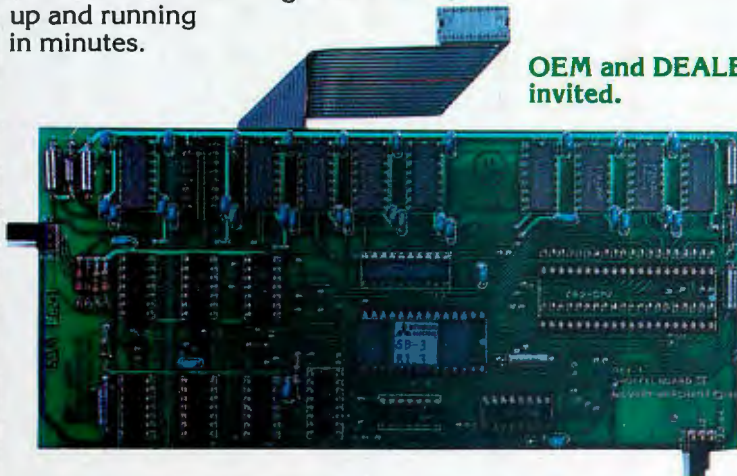
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CP/M REVIEW BUYER'S GUIDE

This second installment contains information and photographs on twenty systems.

Although this second installment does not attempt to cover the marketplace, the 55 systems we have reviewed are a good representation of the variety of available machines. Rather than continue with this broad overview, we have decided that subsequent Buyer's Guides will focus on a specific user interest, i.e., portability, graphics capability, 16 bit machines, etc.

Again, consider this guide to be a starting point in selecting a computer. Addresses and phone numbers for the manufacturers are listed if you would like more detailed information. The second installment features information and photographs on twenty more systems.

ORIENTATION

While most systems are classified general purpose, some are targeted for certain market sectors (a manufacturing environment, typesetting, etc.). This category may aid you in quickly finding the specific systems particularly suited to your needs.

MASS STORAGE OPTIONS

Many users underestimate their disk storage requirements and do not understand the implications of adding hard disk. Make sure the system you are considering has ample expansion to at least twice your current estimate. And, note that some systems represented prefer to deliver with a Winchester as standard equipment. Winchester disks with five megabytes are becoming available and inexpensive. However, the cost of adding them later may be prohibitive.

DISPLAY CONSOLE

There are many pros and cons to the component approach versus the integrated package. The component approach does allow flexibility in selection of equipment. However, the integrated package generally requires less space. For those interested in the component approach, note that many CP/M systems provide only the computer and disk. It's up to you to select a keyboard and CRT. Also note that there are numerous terminals with various video attributes (green phosphor, 80 columns, etc.). Again, you have the opportunity to select what best suits your needs.

OTHER I/O SUPPORT

Adding peripheral devices often requires external connectors and sometimes an additional electronic component (or slot) in the computer chassis. If the initial configuration is not large enough, electronics and connectors can be more expensive than buying a larger computer in the first place.

SALES AND SERVICE

Although most microcomputers are very reliable, if there isn't local service a round trip to the nearest regional repair center may take ten days or more.

PRICE

In most cases, the price quoted in this guide is based on the standard usable configuration of CPU with 64KB memory, 2 floppy disks, keyboard and display, and CP/M. However, when doing price comparisons, note that: 1) Some manufacturers do not provide the keyboard and display. Therefore, you should add about \$600 for a typical display device. 2) Some manufacturers offer more than our standard configuration (i.e. 256KB memory or extra software) and bundle it into their price. These cases require some special consideration.

INSTALLMENT NUMBER 2

Advantage I

A powerful, compact, and self-sufficient computer.

ORIENTATION

Business and scientific data processing with high resolution graphics capability.

MANUFACTURER

North Star Computers Inc.
14440 Catalina St.
San Leandro, CA 94577
415 357-8500

In less than five years, North Star is a high growth, privately held corporation with annual sales growing at a 67% compound rate with Net Profit After Tax of over 10%.

FIRST DELIVERED

September, 1981.

PROCESSOR

Z80A.
64KB standard main memory.
256KB maximum main memory, with the 8/16 (8088) option.

MASS STORAGE OPTIONS

2 5 1/4" Double-sided double-density floppies, with 360KB each.

DISPLAY CONSOLE

A green phosphor (P31) monitor with an 80x24 character display. Graphics resolution is 640x240 pixels, having 20KB of its own bit-mapped storage.

PRINTER INTERFACE SUPPORT

Printer interface capability lies in the Advantage's standard I/O ports.

OTHER I/O SUPPORT

RS232 asynchronous/synchronous serial port. Parallel 8 bit in and out port, with 3 handshaking lines. Of the 6 card slots, 5 are available for expansion.

PACKAGING

Integrated desktop computer, with 87 key style selectric keyboard, including 15 function keys and 14 key numeric/cursor control keypad.



SALES AND SERVICE

Nearest dealer information:

800 447-4700

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Other software included:

Business Graphics.

Price for the above:

\$3,748.

Guarantee:

90 days.

System serviced by:

Factory and authorized dealers.

VENDOR STATEMENT

The North Star ADVANTAGE is an interactive integrated graphics computer supplying the single user with a balanced set of business data, word, or scientific data processing capabilities along with both character and graphics output. ADVANTAGE is fully supported by North Star's wide range of system and application software.

Altos ACS8000-2

If you're a businessperson, health care specialist, legal, insurance, or accounting professional, Altos has a computer system designed for you.

ORIENTATION

Word processing, specialized business fields, multi-user expansion and local networking.

MANUFACTURER

Altos Computer Systems
2360 Bering Drive
San Jose, CA 95131
408 946-6700

Established in 1978, Altos is now a \$40 million per year world leader in single board microcomputer technology.

FIRST DELIVERED

1980.

PROCESSOR

Z80A CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5¼" floppies, single-sided, double-density disks for a total storage capacity of 1MB.

DISPLAY CONSOLE

Any standard ASCII terminal.
The Altos 1 terminal is available for \$995.

PRINTER INTERFACE SUPPORT

Serial or parallel standard.

OTHER I/O SUPPORT

2 RS232 ports and 1 8-bit parallel port are provided.

PACKAGING

Integrated desk-top package.



SALES AND SERVICE

Nearest dealer information:

800 662-6265 (California only).
800 538-7872 (All other).

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
CP/M.

Price for above:

\$3,650. plus keyboard and display.

Guarantee:

90 days.

System serviced by:

Local dealer service.

VENDOR STATEMENT

Altos computers feature a simple, reliable single-circuit board design. A design that allows us to pack sophistication into every Altos computer system. And as your needs grow, Altos computers are easily upgraded.

Approach I

*Special emphasis on computer control applications
in the lab, factory, or home.*

ORIENTATION

General business and engineering.

MANUFACTURER

Micro-Link Corporation
624 S. Range Line Road
Carmel, IN 46032
317 846-1721

Established in 1977, product line includes ROM programmers and STD board products.

FIRST DELIVERED

The Approach I will be available in June 1983.

PROCESSOR

Z80A CPU.
32KB standard main memory.
256KB maximum main memory.

MASS STORAGE OPTIONS

2 5 1/4" floppies, double-sided, double-density, for a total capacity of 600KB.

DISPLAY CONSOLE

12" non-glare green phosphor CRT.

PRINTER INTERFACE SUPPORT

2 or 4 RS232 serial ports and 8 parallel ports available.

OTHER I/O SUPPORT

5 STD slots for expansion.

PACKAGING

Floppies and CRT integrated with a detachable keyboard. Keyboard has 11 programmable function keys.



SALES AND SERVICE

Nearest dealer information:

800 428-6155

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for above:

\$4,740.

Guarantee:

1 year.

System serviced by:

Regional service centers.

VENDOR STATEMENT

Research and development of the APPROACH series of microcomputers began in September of 1981. The most important feature of the APPROACH series is the simplicity of its implementation. The "user-friendly" software control and Micro-Link's complete selection of STD Bus compatible cards allows customers to use the APPROACH immediately, in lieu of spending weeks learning software and configuring the hardware.

Avatar

A device that converts "dumb" terminals into intelligent workstations.

ORIENTATION

AVATAR specializes in converting ASCII terminals into general business systems while maintaining communications with a host computer.

MANUFACTURER

3R Computers
18 Lyman Street
Westboro, MA 01581
617 366-5300

PROCESSOR

Z80 CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5¼" single-sided floppies with 205KB each, double-sided with 410KB each.

DISPLAY CONSOLE

Any standard ASCII terminal.

PRINTER INTERFACE SUPPORT

Parallel port (Centronics type).

OTHER I/O SUPPORT

Apple CP/M diskette conversion subsystem available (\$250 additional).

PACKAGING

Small compact desktop unit; the two drive system weighs only 20 pounds.

SALES AND SERVICE

Nearest dealer information:

617 366-5300

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
CP/M.

Price for the above:

\$2,345. plus keyboard and display.

Guarantee:

90 days.

System serviced by:

Factory.

VENDOR STATEMENT

The "Intelligent Workstation" provides four main capabilities: a data communications path between the TC1 and the host computer; a "personal computer" mode where any standard CP/M program can be executed; a two-way file transfer capability between the TC1 and any of the supported host computer systems; and a terminal switching capability that allows for concurrency of operation.



Datavue 80-200 Series

This machine gets the job done with one-third the number of chips and electronics of comparable systems.

ORIENTATION

A general business machine with a broad range of configurations. Datavue also provides a 132 column console which is excellent for spreadsheet work.

MANUFACTURER

Datavue Corporation
1911 22nd Avenue South
Seattle, Washington 98144
800 426-9247
Or 206 322-9330

Datavue was founded in 1971 as Garyco Data Systems. There are now 50 dealers nationwide, 12 dealers worldwide.

FIRST DELIVERED

September, 1981.

PROCESSOR

Z80 CPU.
64KB standard main memory.
64KB maximum main memory.
4KB EPROM.

MASS STORAGE OPTIONS

2 5¼" floppies with 1MB each.

DISPLAY CONSOLE

Displaymaster 132-C B&W
11¾"x5¾" screen with
132x24 columns.

PRINTER INTERFACE SUPPORT

Will support RS232 or parallel.

OTHER I/O SUPPORT

2 RS232 ports are standard. Synchronous option available. Light pen optional with Displaymaster.

PACKAGING

Compact desk-top package 12x12x7".
Separate CRT. Detachable keyboard with 95 keys.



SALES AND SERVICE

Nearest dealer information:

800 426-9247
Or 206 322-9330

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for the above:

\$5,030.

Guarantee:

90 days.

System serviced by:

Manufacturer or dealer.

VENDOR STATEMENT

"YOU CAN'T BEAT THE SYSTEM"

If you're in the market for a desktop computer system, your shopping just got a little bit easier. Because the fourteen best computers you can choose from have one thing in common: They're all a part of the Datavue 80 Computer System family. Other computers can't beat the Datavue 80 when it comes to giving you such a wide choice of configurations. And other computers can't beat this system for simplicity and reliability.

DMS-3/F "Fox"

Portability, networking, and ability to emulate any terminal.

ORIENTATION

General business, portability and networking.

MANUFACTURER

Digital Microsystems
1840 Embarcadero
Oakland, CA 94606
415 532-3686

Established in 1975. Product line includes the HiNet Local Area Network equipment.

FIRST DELIVERED

1982.

PROCESSOR

2 Z80 CPUs.
64KB and 16KB standard main memory.
64KB and 16KB maximum main memory.

MASS STORAGE OPTIONS

2 5 1/4" double-sided, double-density floppies for a total storage of 1.2MB.

DISPLAY CONSOLE

9" green phosphor CRT, 80x25 format, reverse video, 96 displayable codes, 32 control codes, 30 programmable function keys.

PRINTER INTERFACE SUPPORT

4 RS232 serial ports.
1 parallel port optional.

OTHER I/O SUPPORT

1 RS422 high speed networking port at 500,000 baud.

PACKAGING

Compact, portable, with detachable keyboard. Approximate dimensions are 18x15x8".

SALES AND SERVICE

Nearest dealer information:

415 532-3686

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for the above:

\$3,995.

Guarantee:

90 days.

System serviced by:

Factory.

VENDOR STATEMENT

With its 9" diagonal screen, "the Fox" has triple the capacity of the most popular portable. Yet the outstanding feature of the 30 pound "Fox" is its performance on or off the HiNet Local Area Network. HiNet is a complete hardware/software network so inexpensive that you can add a computer anywhere your business requires for about the cost of a good typewriter.



This micro features a built-in Winchester with a tape backup.

ORIENTATION

A business workstation with strong communications capabilities.

MANUFACTURER

Barrington International Corp.
738 Airport Blvd. Suite 4
Ann Arbor, MI 48104
313 769-7611

Established in 1980, aiming for an initial network of 50 dealers by the end of the year.

PROCESSOR

Z80B CPU.
64KB standard main memory.
2KB CACHE memory standard.
64KB maximum main memory.

MASS STORAGE OPTIONS

System based on built-in 5 1/4" Winchester with 10MB and a built-in tape backup. Floppy drives are not necessary, however, a floppy controller is built-in and floppies are available. Winchester storage is expandable, in increments of 13.5MB, to over 100MB.

DISPLAY CONSOLE

Any ASCII terminal.

PRINTER INTERFACE SUPPORT

1 parallel Centronics type standard.
1 RS232 serial interface standard.

OTHER I/O SUPPORT

2 serial interfaces are standard. Expansion slots available for additional serial ports and disk drives and real time clock with battery backup.

PACKAGING

Compact desktop unit containing the Winchester disk, tape unit and electronics.

SALES AND SERVICE

Nearest dealer information:

313 769-7611

Standard system for price comparison:

CPU with 64KB memory.
Winchester and tape drive.
CP/M.

Other software included:

Condor DB Management, Wordstar, Comshare spread sheet.

Price for the above:

\$7,995. plus keyboard and display.

Guarantee:

90 days.

System serviced by:

Dealer.

VENDOR STATEMENT

E'LITE provides speed, storage capacity, backup capability, and flexibility to do almost any business job. With modular growth and a wide range of communications facilities, it is the ideal tool for the performance-oriented business manager.



Episode

A compact stand-alone computer . . . just add peripherals.

ORIENTATION

Business and communications workstation.

MANUFACTURER

Epic Computer Products
18381 Bandilier Circle
Fountain Valley, CA 92708
714 964-4722

PROCESSOR

Z80A CPU.
64KB standard main memory.
96KB maximum main memory.

MASS STORAGE OPTIONS

2 5 1/4" floppies with 400KB each.
1.5MB and 800KB available.

DISPLAY CONSOLE

Any ASCII terminal. Software to support 80x25 character format, reverse video, underline, and dual intensity.

PRINTER INTERFACE SUPPORT

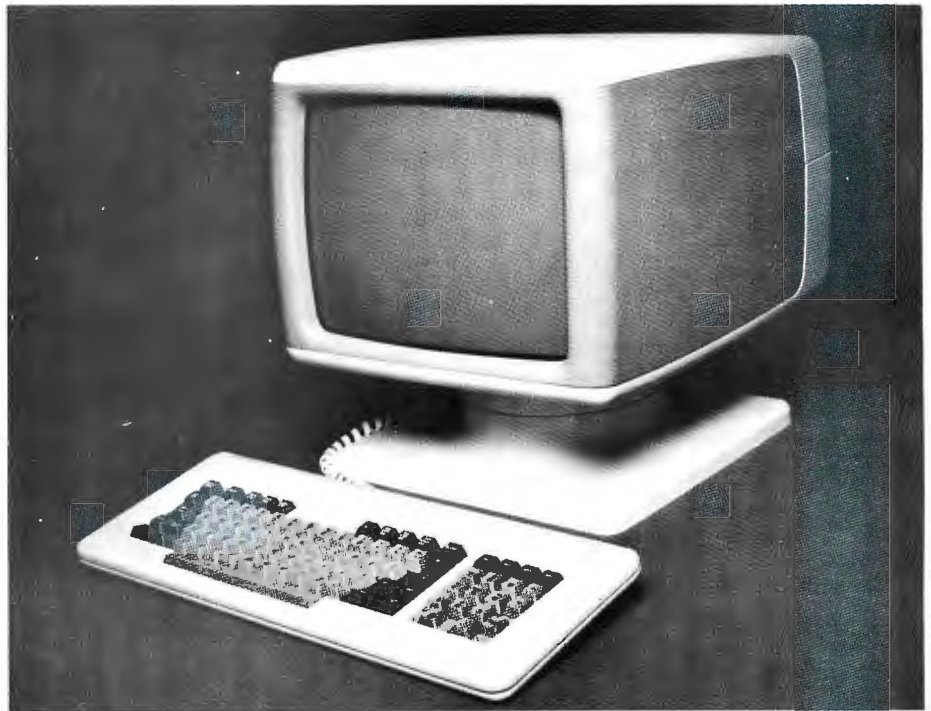
1 parallel Centronics type interface standard.

OTHER I/O SUPORT

2 RS232 serial ports standard.
Expansion slots available.
Telecommunications software in ROM.

PACKAGING

Compact plastic case, 7x9x15".
Weight is 15 pounds. Floppies integral to package.



SALES AND SERVICE

Nearest dealer information:

714 964-4722

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
CP/M.

Other software included:

Communications software in ROM.
SUPERXYZ, an interactive system manager.

Price for the above:

\$2,500. plus keyboard and display.

Guarantee:

90 days parts and labor.

System serviced by:

Factory.

VENDOR STATEMENT

Epic Computer Products, Inc., after extensive research, has developed a new, personal workstation called EPISODE; a stand-alone, portable, single-user computer capable of communicating via networks and sharing data bases. EPISODE gives you total flexibility. The system does not come packaged with integrated peripherals. You can add your own CRT and printer; whatever brand and price range you choose.

Escort C2100

An innovative and competitive state-of-the-art portable.

ORIENTATION

Travel almost anywhere with ESCORT's unmatched capabilities and enjoy fingertip access to professional computing power with this portable.

MANUFACTURER

Jonos Ltd.
920-C E. Orangethorpe
Anaheim, Ca 92801
714 871-1082

Jonos Ltd. was established 2 years ago. They originally manufactured point of sales terminals.

PROCESSOR

80A.
64KB dual port standard main memory.
128KB maximum main memory.

MASS STORAGE OPTIONS

2 3½" micro floppies with 322KB each with DMA controller that can handle up to 3 drives maximum.

DISPLAY CONSOLE

Green phosphor (P31) 9" diagonal with two intensity levels and a 2KB self contained memory. A graphics capability is now on ESCORT's drawing board.

PRINTER INTERFACE SUPPORT

RS232 serial port (up to 19.2K baud). There is an optional integral impact 5x7 dot matrix printer, capable of dot graphics. Its speed is 50 cps at 80 columns and adds an additional 9 pounds. This addition extends the depth by 4" and the width by 9½".

OTHER I/O SUPPORT

2 RS232 serial ports (including printer port), interval timer. 8 slot card cage with 5 slots for expansion.

PACKAGING

The Escort is portable and weighs 25 pounds. It has a detachable Selectric style keyboard with 92 keys, including numeric pad and function keys.



SALES AND SERVICE

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Other software included:

SPELLBINDER, SPELLGUARD,
BASIC-80 and MULTIPLAN.

Price for the above:

\$3995.

Guarantee:

12 months.

System serviced by:

Factory.

VENDOR STATEMENT

ESCORT is the only portable computer designed with built-in expandability...it can grow with you, thus protecting your original investment! This expandability is afforded by virtue of an industry standard STD BUS. The basic ESCORT uses three slots, leaving five empty slots for user expansion. With over fifty manufacturers of STD compatible modules representing the U.S., Canada and England, one can virtually configure a computing system as personal as a signature. Expand the system with modem cards, analog cards, memory, graphics or even new CPU cards as they become available. The ESCORT won't die of old age! The compact STD cards enable easy module replacement, when the need arises, thus assuring prompt serviceability.

Explorer 85

A very inexpensive system with 8" floppy drives.

ORIENTATION

Home, professional, and business application.

MANUFACTURER

Netronics R & D Ltd.
333 Litchfield Road
New Milford, CT 06776
800 243-7428

FIRST DELIVERED

1980.

PROCESSOR

8085 CPU.
64KB standard main memory.
S-100 bus expandable.

MASS STORAGE OPTIONS

2 8" floppies with 800KB each.
5 and 10MB Winchesters available.

DISPLAY CONSOLE

Any ASCII terminal.

PRINTER INTERFACE SUPPORT

RS232 serial port.

OTHER I/O SUPPORT

User supplied S-100 boards supported.

PACKAGING

S-100 chassis, floppies, and terminal packaged separately.

SALES AND SERVICE

Nearest dealer information:

800 243-7428

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
CP/M.

Price for above:

\$1,645. plus keyboard and display.

Guarantee:

6 months.

System serviced by:

Factory.

VENDOR STATEMENT

Like all Netronics products, each level of Explorer/85 is engineered to professional standards. Top quality components are used throughout. You are insured, year after year, of stable reliable service.



HP-86

Hewlett-Packard's lowest priced, newest, personal computer.

ORIENTATION

General purpose personal computer for professionals and managers.

MANUFACTURER

Hewlett-Packard
1010 N. E. Circle Blvd.
Corvallis, OR 97330
503 757-2000

FIRST DELIVERED

1982.

PROCESSOR

HP CPU in native mode.
Z80 using CP/M module.
128KB standard main memory.
640KB maximum main memory.

MASS STORAGE OPTIONS

1 5¼" floppy with 270KB standard. Interface built-in for up to 2 HP 9130A's.

DISPLAY CONSOLE

Choice of 9" or 12" green phosphor CRT. Alphanumeric character format is 80x24 or 16 lines. Graphics format is 240x400 or 544 dots. 5x7 dot matrix character font, 256 character set with set of 128 with and without inverse video.

PRINTER INTERFACE SUPPORT

Parallel Centronics is standard. Several other interfaces, HP-IB, serial, BCD etc., are available with a separate card required for each.

OTHER I/O SUPPORT

4 ports accept optional interfaces, modem, memory modules, CP/M module or ROM drawer, IEEE488, graphics tablet, graphics plotter.

PACKAGING

4 I/O slots with keyboard, CPU and integrated CRT. Can attach up to 14 peripherals (floppies, hard disks, plotters, printers, etc.) using 1 HP-IB card.



SALES AND SERVICE

Nearest dealer information:

503 758-1010 (Oregon, Alaska, Hawaii).
800 547-3400 (All other).

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for the above:

\$4,285.

Guarantee:

3 months.

System serviced by:

Various options: Dealer Repair Center serviced by HP at dealer's site for selected dealers, on-site contracts serviced by HP, and return to HP Service Center (more economical than on-site contract.)

VENDOR STATEMENT

The HP-86 personal computer lets you run long, complex programs. The expandable memory also lets you prepare analyses and reports that reduce stacks of information to a workable form. Analyze those data-crunching problems you face every day with concise charts, tables and easy-to-read printouts of your notes and reports. Whether you're a computer novice or an experienced programmer, you can learn to use the HP-86 quickly and easily. The alphanumeric keyboard is so similar to that of a typewriter that it's a snap to type statements and commands. With the 14 user-definable keys you can assign special functions and commands that make your HP-86 a truly personal computer.

Lexoriter Series III

A new low cost text processor as an add-on to electronic typewriters.



ORIENTATION

Word processing, full text processor, document oriented.

MANUFACTURER

Lexor Corporation
7100 Hayvenhurst Avenue
Van Nuys, CA 94106
213 786-1600

Established in 1978, Lexor markets through a network of independent office machine dealers.

FIRST DELIVERED

October, 1982.

PROCESSOR

Z80A CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5¼" floppies, single-sided with 160KB, or double-sided with 320KB each disk.

DISPLAY CONSOLE

12" 80x24 black on white or white on black CRT, optional green phosphor. Selectable intensity, 9x12 dot matrix with true descenders.

PRINTER INTERFACE SUPPORT

Lexor will interface to electronic typewriters offered by Royal, Adler, Remington, Silver-Reed, Olivetti, and Olympia. IBM 50, 60 and 75 will be available soon.

PACKAGING

A time-of-day clock is standard. System comes with an auxiliary keypad containing the text processing function keys. The CRT is movable; the electronics and disks are packaged in a compact desktop unit which acts as a base for the CRT.

SALES AND SERVICE

Nearest dealer information:

213 786-1600
Or 703 448-8680

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for above:

\$2,195. plus typewriter I/O.

Guarantee:

90 days.

System serviced by:

National Office Dealers Association.

VENDOR STATEMENT

The Lexoriter Series III Text Processing Systems are based on Lexor word processing software that contains features normally found only in systems costing many thousands more. The Lexor word processing software is document-oriented and includes automatic pagination, repagination, document assembly, block insert, copy, move, delete, headers, auto page numbering, and global search and replace.

M6000P

A portable CP/M system for industrial control application.

ORIENTATION

Portability and control applications.

MANUFACTURER

Micro Source Inc.
595 N. Clayton Road.
New Lebanon, OH 45345
513 687-1395

FIRST DELIVERED

1982.

PROCESSOR

Z80A CPU.
64KB standard main memory.
1024KB maximum main memory.

MASS STORAGE

2 5 1/4" double-sided, double-density
floppies with 386KB each.

DISPLAY CONSOLE

80x24 character format. Green
phosphor CRT. Inverse, dual
intensity, blinking and underline
video attributes all supported.

PRINTER INTERFACE SUPPORT

Parallel Centronics type and
RS232 serial standard.

OTHER I/O SUPPORT

2 RS232 serial ports standard.
6 STD expansion slots.

PACKAGING

Integrated unit, 17x20x7".
Portable, weighing 33 pounds, with
detachable standard keyboard. Exter-
nal connection for 8" floppy disk.



SALES AND SERVICE

Nearest dealer information:

513 687-1395

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Other software included:

Wordstar, Spellstar, Mailmerge,
Calcstar, Superfile, Archivist, and
TeachM.

Price for the above:

\$3,900.

Guarantee:

90 days.

System serviced by:

Factory.

VENDOR STATEMENT

This is a complete portable
microcomputer system. Terminal,
disk drive, memory and processing
unit are combined into one easily
portable package. STD BUS
microcomputer circuit board allows
the user to configure nearly any
application using literally hundreds of
STD BUS circuit boards available
from dozens of STD BUS
manufacturers.

Olivetti M20

Operating an M20 is as easy as using an Olivetti typewriter.

ORIENTATION

General business and personal computing.

MANUFACTURER

Olivetti Corporation
155 White Plains Road
Tarrytown, NY 10591
914 631-8100

Olivetti introduced the world's first desktop computer in 1965. They have over 200 dealers nationwide.

FIRST DELIVERED

April, 1982.

PROCESSOR

Z8001 CPU.
128KB standard main memory.
512KB maximum main memory.

MASS STORAGE OPTIONS

2 5 1/4" floppies with 320KB each.
11MB Winchester available.

DISPLAY CONSOLE

80x25 or 64x16 format. High resolution graphics format of 512x256 pixels.

PRINTER INTERFACE SUPPORT

1 parallel (Centronics) port.
1 RS232 port.

OTHER I/O SUPPORT

4 expansion slots; 2 for memory, 2 for peripherals. IEEE 488 available. Videotex with MODEM available 1983. Plotter capability.

PACKAGING

Integrated desktop design with floppy drives, screen and keyboard built-in. Screen is movable.

SALES AND SERVICE

Nearest dealer information:

914 631-8100

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for above:

\$3,900.

Guarantee:

90 days.

System serviced by:

Dealer.

VENDOR STATEMENT

Dollar for dollar, the M20 is the most powerful personal computer on the market. It can handle just about any application; electronic spread sheets, accounting, wordprocessing, data entry, communications, scientific or technical. The M20 allows you to visualize the most complex information in high-resolution graphics -- even color.



Rainbow 100

The Digital personal computer that runs both 8- and 16-bit CP/M programs.

ORIENTATION

The Rainbow 100 was designed for the individual interested in doing spread sheet calculations, accessing remote databases, and having a personal computer that can also be used as a timesharing terminal.

MANUFACTURER

Digital Equipment Corporation
Maynard, MA 01754
617 493-2857

PROCESSOR

Both Z80 and 8088 processors.
64KB standard main memory.
256KB maximum main memory.

MASS STORAGE OPTIONS

2 5¼" floppy disks. 409.6KB/disk (not drive), note that each drive will hold two single-sided disks or 819KB/disk. An optional 5MB Winchester disk is available.

DISPLAY CONSOLE

Black and white 12" diagonal monitor has an 80x24 character format, with software selectable 132 column width. Bit-mapped graphics is optional in both black/white and color. Low resolution is 320x240 pixels, while high resolution consists of 800x240 pixels.

PRINTER INTERFACE SUPPORT

RS232 printer port.

OTHER I/O SUPPORT

Asynchronous/synchronous port.

PACKAGING

Detached components include monitor, ergonomic keyboard and floppy drive. The keyboard includes a numeric pad and function keys. The monitor has a swivel base, and the disk drive unit can be placed horizontally or vertically.

SALES AND SERVICE

Nearest dealer information:

800-258-1577

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Other software included:

The system automatically switches between the hybrid CP/M 80 and CP/M 86. MBASIC.

Price for the above:

\$3,745.

Guarantee:

90 days.

System serviced by:

DEC has over 160 Carry-in Service Centers worldwide and a DECmail Module Repair Service.

VENDOR STATEMENT

The Rainbow 100 is made up of a small system box that fits on your desk, stands beside it, or sits on a bookshelf. The box contains a Z80/8088 processor and up to 256,000 bytes of memory, power supply, space for two dual floppy drives for a total of 1,600,000 bytes of online storage, and a printer port. Plug-in options include 64- and 192KB add-in memory boards, a communications board, and a Bit-map Option that adds color and monochromatic shading capabilities. And, as is in the case of Digital's other personal computers, you have a choice of three printers - a letter quality printer, a desktop printer, or a three speed printer that provides high quality, intermediate quality, and high speed dot-matrix printing.



Topper

Desktop telecommuting console for 3270 networks.

ORIENTATION

General business.

MANUFACTURER

Beehive International
4910 Amelia Earhart Drive
Salt Lake City, UT 84125
800 453-9454

Long established vendor of ASCII
CRT terminals. Nationwide sales and
service in place.

PROCESSOR

8085 CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5¼" floppies with 500KB each.

DISPLAY CONSOLE

High resolution, glare-free green
80x25 CRT.

PRINTER INTERFACE SUPPORT

Serial RS232 standard.

OTHER I/O SUPPORT

3270 to host port standard.

PACKAGING

Integrated desktop with detachable
keyboard.



SALES AND SERVICE

Nearest dealer information:

801 355-6000

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for the above:

\$2,995.

Guarantee:

90 days.

System serviced by:

Retail vendor, a service contract is
available, and third party.

VENDOR STATEMENT

While Beehive has an extensive
product line that provides you with
a choice of performance, we also
have the support programs you
would expect only from a "customer-
oriented" company. The Topper can
be a stand-alone computer, an IBM
terminal, or an ASCII terminal.

Vector 4

A powerful computer with the features you need for today and tomorrow.

ORIENTATION

Vector 4 is an advanced 8/16 bit desktop computer. It allows you to take full advantage of the existing base of 8-bit CP/M programs for business, industrial, and scientific applications, while providing for the future move to the power of 16-bit processors.

MANUFACTURER

Vector Graphics, Inc.
500 North Ventu Park Road
Thousand Oaks, CA 91320
805 499-5861

Vector Graphics incorporated in 1976 and today states total revenues of \$36,223,000, with a net income of \$2,367,000. Dealers total 503 worldwide, and the company employs 385 people.

FIRST DELIVERED

1982.

PROCESSOR

Z80B and 8088.
128KB standard main memory.
256KB maximum main memory.

MASS STORAGE OPTIONS

The model 4/20 contains 2 5¼" floppy drives, with 630KB each. A Winchester version is available.

DISPLAY CONSOLE

A green phosphor (P31) 12" diagonal monitor, with a 80x24 character format. High resolution black and white graphics is 640x312 pixels. The Vector 4 display generator also produces standard RGB signals.

PRINTER INTERFACE SUPPORT

Centronics Parallel Interface.
Qume/NEC Parallel Interface.
RS232 Serial Printer Interface.

OTHER I/O SUPPORT

Serial keyboard, RS232 communications interface, RGB color signals, programmable tone generators and speaker, S-100 expansion card slots.



PACKAGING

Detachable keyboard, with 91 keys including function keys and numeric pad.

SALES AND SERVICE

Nearest dealer information:

1 800 235-3547

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for the above:

\$4,495.

Guarantee:

90 days.

System serviced by:

Factory, TRW.

VENDOR STATEMENT

Superb graphics capabilities and programmable sound generators make the Vector 4 ideal for business and scientific applications where both sight and sound cues can be used to enhance user interaction with applications programs. In gray scale graphics mode, four or sixteen levels of gray provide new dimensions in the displaying of charts, graphs, and illustrations by using the various densities and gradations from white to black.

Xerox 820-II

*The professional workstation with
a link to Xerox's Ethernet network.*

ORIENTATION

Xerox 820-II personal computer is both a stand-alone system and an entry-level professional workstation on the company's Ethernet office communications network.

MANUFACTURER

Xerox Corporation
1341 West Mockingbird Lane
Dallas, Texas 75247
214 386-9400

Xerox Corporation introduced its first automatic copier in 1959. Today, the company is in the information systems business worldwide, with about 45% of its revenues generated outside the United States. In 1981, Xerox had revenues of \$8.6 billion.

FIRST DELIVERED

July 1, 1982.

PROCESSOR

Z80A CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5 1/4" Single-sided double-density, with 155KB/disk (usable). Options:
5 1/4" Double-sided double-density, with 322KB/disk,
8" Single-sided double-density, with 482KB/disk,
8" Double-sided double-density, with 980KB/disk,
10MB fixed disk.

DISPLAY CONSOLE

Black and white monitor, with an 80x24 character format and 2 intensity levels.

PRINTER INTERFACE SUPPORT

To simplify installation, printer adaptor kits are provided as standard equipment.

OTHER I/O SUPPORT

2 serial ports.
2 parallel ports.
Standard system bus access.

PACKAGING

Separate keyboard, monitor and disk drives form a desktop configuration. Detachable keyboard includes a numeric pad.

SALES AND SERVICE

Nearest dealer information:

800-527-1675

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Other software included:

BASIC-80 and CBASIC II.

Price for the above:

\$3,295.

Guarantee:

90 days.

System serviced by:

Several service options are available to Xerox 820-II users. They are on-site service, carry-in service centers, pick-up and delivery -- with or without a loaner -- and centralized depot service. The company also maintains a customer support center in Dallas to provide assistance over the telephone.

VENDOR STATEMENT

The Xerox 820-II, announced in June, 1982, is an entry-level professional workstation for network use as well as a personal, desktop computer. To enhance the personal computer for this use, the company added communications options, made a 10MB fixed disk available, and included a bus access slot. Other changes for the 820-II are a faster processor and an improved CP/M operating system. The Xerox 820-II can be attached to the company's Ethernet local area network, which can provide access to mass storage, laser printing, and other computers and office equipment. Communications options also include TTY, 3270, 3780, 2770, 2780, and 3741 protocols. With these options, the 820-II can serve as an intelligent terminal, transmitting to and receiving information from mainframe computers, or as a batch processing terminal or teletype unit.



Z90-2

*For those who like the Heath computer,
but don't want to build a kit.*

ORIENTATION

Home, professional, and business computer.

MANUFACTURER

Zenith Data Systems
100 Milwaukee Avenue
Glenview, IL 60025
312 391-8192

FIRST DELIVERED

1981.

PROCESSOR

Z80 CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5 1/4" floppies with 160KB each.

DISPLAY CONSOLE

12" green phosphor CRT. 80x25 character format, blinking reverse video and underline supported. Keyboard has 8 programmable function keys.

PRINTER INTERFACE SUPPORT

RS232 serial interface.

OTHER I/O SUPPORT

2 RS232 serial ports standard.

PACKAGING

Keyboard, CRT and electronics are integrally packaged. Dual floppies in separate unit.

SALES AND SERVICE

Nearest dealer information:

312 391-8192

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Other software included:

Microsoft BASIC.

Price for the above:

\$4,198.

Guarantee:

3 months.

System serviced by:

Dealer.

VENDOR STATEMENT

World famous Zenith quality now comes in very affordable state-of-the-art microcomputers especially designed for both small and large business use. Currently available software options offer broad business, financial planning, and inventory control capability - as well as word processing, research, scientific and other technical applications.



Zorba

*A new high performance portable system
with a 7" screen in a rugged package.*

ORIENTATION

Data communications and industrial applications.

MANUFACTURER

Telcon Industries Inc.
1401 N. W. 69th Street
Ft. Lauderdale, FL 33309
305 971-2250

Established 12 years ago; produces a complete line of communications equipment.

FIRST DELIVERED

1982.

PROCESSOR

Z80 CPU.
64KB standard main memory.
64KB maximum main memory.

MASS STORAGE OPTIONS

2 5¼" floppies with 380KB each.

DISPLAY CONSOLE

7" green phosphor CRT. 80 x 25 character format. Reverse video, blinking, underline, and half intensity are all supported. Keyboard has 19x4 programmable function keys.

PRINTER INTERFACE SUPPORT

1 Centronics type parallel interface.

OTHER I/O SUPPORT

2 RS232 serial ports standard. 1 PIA port standard.

PACKAGING

Compact, portable integrated package with detachable keyboard. 115/220 VAC, 50/60 HZ supported.



SALES AND SERVICE

Nearest dealer information:

305 971-2250

Standard system for price comparison:

CPU with 64KB memory.
2 floppies (or equivalent).
Keyboard and display.
CP/M.

Price for the above:

\$1,595.

Guarantee:

90 days.

System serviced by:

Nationwide service available through 3rd party maintenance contractor.

VENDOR STATEMENT

Telcon, an established telecommunications company, proved that heavyweight technology can be designed into a lightweight, rugged portable.

AMX

Real-Time Multitasking Executive

for
8080, Z80
and 6809

Gives your application a head start

AMX can save you time and money. You can capitalize on our years of multitasking experience. Start your application using a software executive proven with three years of fault-free operation.

Professional software designers use AMX as the starting point for their product and system designs. AMX shields them from the difficulties of managing the micro, freeing them to concentrate on their application.

SIMPLE OPERATION

Complex control programs are divided into a number of separate, more manageable programs, called *tasks*, each designed to do one job. Tasks are written and tested separately and then combined to form a reliable, finished system.

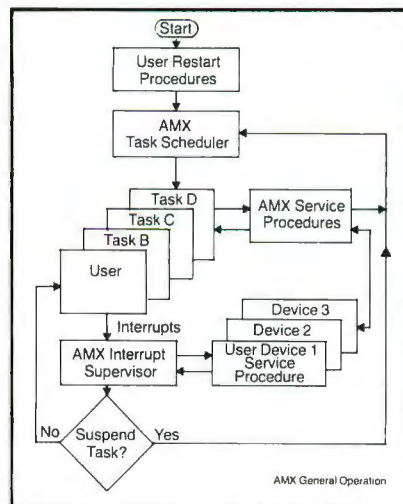
AMX supervises the orderly execution of these tasks, assuring that the most important jobs always get done first. Tasks appear to be executing simultaneously. It's almost like having a separate CPU for each task!

HARDWARE INDEPENDENCE

AMX does not require a particular hardware configuration. You control

your environment. You pick the I/O method. You decide the preferred interrupt service technique for your system. AMX will support your choice.

AMX is fast, compact, and ROMable. Even though the AMX nucleus is less than 1400 bytes in size, it features multiple task priorities, intertask message passing with priority queuing, external event synchronization, and interval timing.



CP/M is a trademark of Digital Research Corp.
Z80 is a trademark of Zilog Corp.

Interface modules are available to allow AMX to be used with C, PASCAL, PL/M, FORTRAN and assembler.

Access to CP/M® disk files in real time is possible using the AMX I/O Supervisor.

COMPLETE DOCUMENTATION

AMX can be judged by the quality of our documentation.

We deliver AMX source on diskette to permit AMX to be moved to the software development system of your choice. Our liberal license agreement permits binary (object) distribution without royalties.

HOW TO ORDER

A specification sheet and price list are available, free. Your check or money order for \$75 will purchase the AMX Reference Manual for immediate evaluation (specify 8080, 8085, Z80 or 6809 processor). Add \$25 for postage and handling outside USA and Canada. The standard AMX Multitasking Executive package, including source code, is \$800.

AMX is the choice of professionals the world over. Make it yours, today.



KADAK Products Ltd.



206-1847 W. Broadway Ave., Vancouver, B.C., Canada V6J 1Y5 Phone: (604) 734-2796 Telex: 04-55670

Products and News

Enhanced Microcomputer Critical Path Project Management System

North America MICA has announced Version 3.0 of PMS-II, a Critical Path Project Management System for microcomputers. In addition to a rewritten manual, containing a tutorial section as well as an introduction to project management and network diagramming for the first time user, the system now produces a three part earned value analysis which shows the value of work accomplished as a percent of the budgeted amounts for each activity in both tabular and graphic forms.

An expanded repertoire of utilities allows the entire project network file to be unloaded to a standard CP/M data file format accessible by Data Base Management Systems such as dBASE II, so that users can create their own customized reports. A project "cloning" utility allows the user to define a prototypical project network and then make copies of it for unique applications.

For more information contact: Director of Marketing, 714-481-6998

Software Directory Lists More Than 400 Programs For Zenith's Z89 and Z90

A software directory listing more than 400 programs for Zenith's Z89 and Z90 microcomputers has been compiled. The Directory contains a full-page description of each of the programs listing the vendor, telephone number, a summary of features, operating system requirements, programming language, diskette format, number of drives, memory requirements and whether source code is provided.

The Software Directory, oriented to the business market, lists programs for accounting, agribusiness, communications, languages, DBM's, education, insurance, legal, medical, and many more.

The new directory is available from Zenith Data Systems dealers and Heathkit Electronic Centers. It retails for \$25.

New 3.0 Version of FMS-80 Software Introduced by DJR

A major upgrade and enhancement of the FMS-80 file management system, termed Version 3.0, has been announced by DJR Associates, Inc.

Among many new features of the new FMS Version 3.0 are such innovations as nearly instantaneous addition of new records. Users now have complete control over screen characteristics and video attributes. The menus that make the program "user-friendly" have been upgraded for greater clarity. New user-optional functions handle deleted records and packing of data files and generation of automatic record numbers for use as unique keys without compromising data file integrity. FMS can now interact with commercially available sort utilities such as SuperSort and QSORT.

Registered FMS owners can upgrade to Version 3.0 by sending \$100 directly to DJR Associates, 303 South Broadway, Tarrytown, NY 10591. The retail price of FMS-80 Version 3.0 is \$990. For information, contact Glen Hart at 914-357-2055.

Techland Software Helps Business Manage Schedules and Expenses

An easy-to-use computer software package that helps executives better manage their business life has been introduced by Techland Systems, Inc. The package, called Shoebox™ 1.1, is used for appointment scheduling and expense reporting tasks and is compatible with CP/M based microcomputers.

The software was developed to make the business of doing business easier by providing a system for executives to work more efficiently. No knowledge of programming languages is required.

The software features: A calendar to help plan a daily schedule as far ahead as the user likes — appointments, reminders of task schedules, a tickler file, and to do lists are tracked to avoid conflicts; a recurring item schedule; printed schedules for as

many days as a user wants; expense recording and expense reporting. The price is \$295.

Contact Techland Systems, Inc., headquartered in Mount Vernon, NY on 914-699-8467. The price is \$295.

New Micro DBMS Emphasizes Ease of Use

To meet the need for a Data Base Management System than can be used by end-users to create their own applications without programming, Micro Applications Group (MAG) has announced its latest software product called MAG/base.

Derived from MAG's popular PRISM package, MAG/base is said to differ from competitive DBMS's primarily because it uses a simplified operational approach. Rather than being command oriented, MAG/base utilizes a simple fill-in-the-blank style. This enables MAG/base users to create their own files, reports, and special forms without the need for a specialized computer language.

To meet a wide range of needs, MAG/base is offered in three levels, each providing additional capabilities. All three levels are upwardly compatible and users may upgrade from one to the next as their requirements grow.

MAG/base is compatible with microcomputers using any of the Digital Research operating systems - CP/M, MP/M, CP/M-86, and MP/M-86. MAG/base is available from Micro Applications Group, 20201 Sherman Way, Suite 205, Canoga Park, CA 91306, 213-700-1426

File Difference Detector Announced

A software package for detecting and reporting differences in CP/M files is now available from The Software Toolworks. AUTODIFF can locate all changes in a new version of a document or program source file, listing the differences or producing a copy of the file with all changes marked.

More than just a simple byte by byte comparison, it locates insertions, deletions or changes, and lists them on the terminal, printer or a disk file. Output formats available include text lines, and bytes in ASCII and hexadecimal format.

AUTODIFF is available for \$31.95 including postage and handling from The Software Toolworks, 14478 Glorietta Drive, Sherman Oaks, CA 91423, 213-986-4885.

FILETRAN for the OSBORNE 1 Computer

Business MicroProducts announces a new addition to its family of FILETRAN products. This latest version retains the high-speed, disk-to-disk file translation features in transferring files from TRSDOS to CP/M and the automated language conversion aids, and sector-by-sector disk contents displays.

FILETRAN for the OSBORNE 1 incorporates a number of new features not found in any earlier versions. The most important of these is the addition of the new CP/M-to-CP/M file transfer module. This new capability transfers files from virtually any CP/M format to the OSBORNE 1 disk format. This module takes advantage of the WD1793 disk controller chip available in the OSBORNE 1 computer.

Another new feature is the incorporation of "wildcard" file transfer capabilities for both the TRSDOS-to-CP/M and CP/M-to-CP/M operations. This feature allows the transfer of selected groups of files to be transferred with just a single "wildcard" file specification, greatly reducing operator input time.

The retail price is \$99. The FILETRAN Operations Manual sells for \$20. Contact Business Micro Products at 1-800-547-5995.

Arcade Style Games for CP/M available from C.D.E.



Arcade style games for CP/M are available from C.D.E. CATCH-UM has a maze on your CRT where you eat the dots while chased by vicious letters. Eat the energizer and you can chase them (sound familiar?). LADDER is where you climb the ladders to get the prize at the top but jump over the O's that roll down from the top.

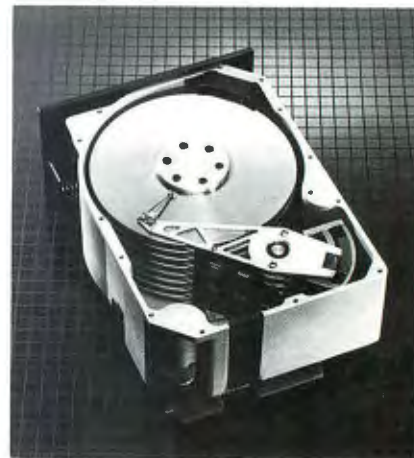
Both games play on the CRT with user selected keys for UP, DOWN, LEFT and RIGHT. Ladder also uses the space bar for JUMP. Personaliza-

tion program included tailors the program for any terminal with direct cursor addressing, and takes less than a minute.

Both games for \$39.95, or \$24.95 each. Contact C.D.E., 2463 McCready Avenue, Los Angeles, CA 90039, 213-661-2031.

5 1/4" Winchester Packs 140MB on 8 Disks with 30-MS Access Time

The industry's first high-performance 5 1/4" Winchester disk drives with more than 100 megabytes capacity have been introduced at COMDEX by Maxtor Corporation. The mini-floppy sized Winchester disk drives are available in capacities of 65MB, 105MB and 140MB. Average access time for all drives is 30 milliseconds. The Maxtor disk drives are compatible with the industry standards and have a data transfer rate of 5 megabits per second.



Initial deliveries are scheduled for the first quarter of 1983, with volume shipments slated to begin in the second quarter. Maxtor 5 1/4" Winchester disk drives are designed for use by OEMs in such products as multi-user mini and microcomputers, intelligent terminals, word processing systems and graphics systems.

Contact Maxtor Corporation, 5201 Lafayette St., Santa Clara, CA 95050, 408-748-7740.

Third Edition of CP/M Software Index Available

The third edition of the Small Systems Group's CP/M Software Index has just been published. The most comprehensive directory of CP/M based software to date, the Index lists 1,688 professionally supported programs, offered by 507 vendors. A brief

description, the vendor's name, address, and phone number, the price, and operating system versions are shown for each package. All of the indexed programs are available for the CP/M-80 operating systems and many are also available under CP/M-86, MP/M-80, MP/M-86 and Concurrent CP/M-86.

The Index is organized into five major areas: Systems Programs, General Applications, Accounting Applications, Utility Applications and Industry Specific Software. These areas are broken down into 89 categories. Example categories are Data Management, Integrated Accounting Packages, Medical, etc.

Single copies of the Index are \$10, prepaid Dealers and OEMs will receive credit for their examination copy when a quantity order is placed. Contact Small Systems Group, Box 5429, Santa Monica, CA 90405, 213-392-1234.

Elliam Offers Micro Resources WASH

For the new CP/M user there are no complicated CP/M commands to use. The experience CP/M user will appreciate the speed in copying and deleting files.

With WASH the user just tags the file names (shown in alphabetic order on the screen) and the program copies them all to another disk. No need to do multiple PIP's. The same approach applies to ERasing files, but the program gives you a second chance to change your mind. To RENAME and file only the new name has to be entered.

The operator may select a specific file from the file name list by moving forward or backward through the list. A ZIP ahead command moves in a forward direction ten file names at a time to permit rapid access to a given file.

The price of the program with complete installation instructions and users manual is \$49.50 plus \$1.50 for shipping and handling. Contact Elliam Associates, 24000 Bessemer Street, Woodland Hills, CA 91367, 213-348-4278.

Genie Computer Corporation Introduces the First Fixed/Removable Winchester Cartridge Drive

Genie Computer Corporation has unveiled the first 5 1/4" Winchester Fixed/Removable Disk Cartridge drives for the IBM PC, Apple II Plus, Radio Shack TRS 80, and S-100 systems.

Tektronix Announces High Quality Color Graphics Copier

Tektronix, Inc. has added the model 4691 color graphics copier to its line of hard copy units. The unit uses an ink-jet technology to produce eight color copies from computer graphics systems.

Ink is supplied from separate ink cartridges containing yellow, cyan, and magenta color which mix to print red, green, and blue. Black comes from a fourth ink cartridge, rather than from a mixture of primaries, resulting in a dense, solid black. High resolution

is the result of the combined capabilities of addressability, dot size and placement accuracy. The 4691 has higher addressability than any ink jet color copier currently available, and can place 150 dots per inch in both horizontal and vertical directions.

Another special feature of this ink on demand technology involves an automatic mini-cleanse of the printing heads after each copy. For further information on the 4691 Color Graphics Copier, contact the Marketing Communications Department, Tektronix, Inc., P. O. Box 500, Beaverton, OR 97077, 503-644-0161.



The Genie Winchester Cartridge Disk Drive is a new 10 megabyte Hard Disk Drive that includes a 5 megabyte removable Winchester cartridge disk. The cartridge drive system simply plugs into your computer, and includes all necessary software and hardware. Genie drives are compatible with most popular software, and each cartridge replaces up to 30 double-density floppy drives.

Features include: 10 megabytes of on line storage, file sizes to 5 megabytes, power-on self-test, easy back-ups in minutes, system expandable to 8 drives, built-in error detection and correction, no preventative maintenance required, comes complete with all necessary software and hardware.

The Genie 5 + 5 has a suggested list price of \$3,995. Contact Marvin Raizer, Genie Computer Corporation, 31125 Via Colinas #908, Westlake Village, CA 91362, 213-991-6210



R & B Client Programmed Accounting Now Available on CP/M

A new CP/M version of R & B Client Programmed Accounting has just been released. The greatest feature is flexibility; it will run on any CP/M microcomputer using either floppy or hard disk drives. And a version designed for 16-bit 8086/8 microprocessors will be available December 1982.

The complete menu-driven package satisfies a wide variety of needs in the accounting office. It generates customized financial statements and comparative statements. Reports include journals, general ledger, trial balance, loan amortization schedules, comparative and budgetary financial statements, statement of changes in financial position, balance sheet, statement of income. It also prints W-2 forms and mailing labels.

This package retails for \$2,495. Contact R & B Computer Systems, 648 South River Drive, Tempe, AZ 85281, 800-528-7385.

Financial and Vertical Market Software Runs On Either 8- or 16- Bit Hardware

International Micro System's entire line of financial and vertical marketing software can not run on either 8- or 16- bit microcomputers, according to an announcement made today by Bill Watson, President of IMS. Diskettes containing IMS source code can be used with any CPU that has a CP/M-80, CP/M-86, MP/M-80 or MP/M-86 operating system and CBASIC language.

IMS develops and supports a full line of financial and vertical market software including General Ledger, Accounts Payable/Receivable, Payroll, Medical and Dental Office Management, Manufacturing Inventory Control, Wholesale Distribution, Church Management and School Management among others.

IMS will release version 4.0 of its software containing the 8/16 bit compatible program modules and other enhancements. Upgrades at reduced prices will be available to current IMS dealers and their customers. Contact International Micro Systems, 6445 Metcalf, Shawnee Mission, KS 66202, 913-677-1137.

CP/M Micro Co-Processors for the DEC UNIBUS and Q-bus.

Virtual Microsystems, Inc. announced the release of the Z-Board micro co-processor for the UNIBUS and Q-Bus. The Z-Board works with VMI's product THE BRIDGE to provide a complete virtual CP/M environment on a VAX, PDP-11, or LSI-11 mini-computer.

The UNIBUS version of the Z-Board features 4 Z80 microprocessors and a full 256 kbytes of memory, along with a bit slice state machine which handles the bus interface. The Q-Bus version is similar, but may be populated with 1 to 4 Z80s. Each of the Z80s operates independently, providing each BRIDGE user with a full microcomputer functionality at any of the attached terminals.

The BRIDGE and Z-Board combination are cost effective; each slot on the Z-Board costs around \$1000 - far less than a "low end" personal computer; yet the BRIDGE provides hard disk,

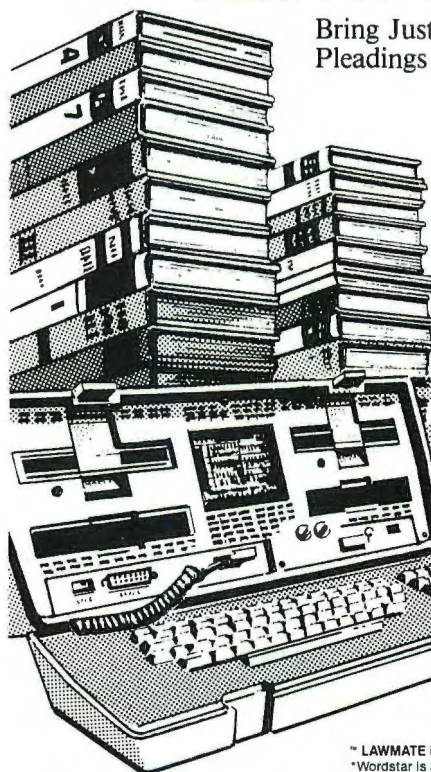
access to the fast system printers, and is integrated into an already existing professionally managed system.

The BRIDGE and Z-Board are available now for the full range of DEC computers under all the major DEC operating systems. Contact Virtual Microsystems, Inc. 2150 Shattuck Avenue, Suite 720, Berkeley, CA 94704, 415-841-9594.

Information printed in the new product pages of CP/M REVIEW is obtained from "new product" or "press release" copy sent by promoters of new products. If in our judgment the information might be of interest to the CP/M community, we print it in some form. We openly solicit releases and photos from manufacturers and suppliers to this marketplace. While we would not knowingly print untrue or inaccurate data, or data from unreliable companies, our capacity to evaluate the products and companies appearing in "Random Access" is necessarily limited. We, therefore, cannot be responsible for product quality or company performance.

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THE ORTHOCODE CORPORATION
P.O. Box 6191
Albany, CA 94706
(415) 753-3222

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* Wordstar is a Trademark of MicroPro International

Public Bulletin Boards Updated with expanded interests

During the past year, the bulletin boards that are available nationwide have grown in number and diversity. Most of the electronic message systems have some orientation, reflecting the special interests of their host. They range from special computer interest groups to dating services. Occupational and hobby groups, such as aviation and medical, are also on the list of interesting possibilities. In the last issue of CP/M REVIEW, we presented bulletin board activity

specifically oriented toward the CP/M community.

In this issue, through the courtesy of Glenn L. Gorman's MINIBIN in Seattle, Washington, you will find an extensive list of other bulletin boards. Glenn's system utilizes a list compiled by Don Purvis's Peoples Message System in Kenmore, Washington. Having the list sorted alphabetically has been most helpful in determining the homogeneous groupings throughout the country. Most bulletin

boards offer their own versions of "Other Bulletin Board" lists. In some cases, these will reflect other systems operating within their immediate locale, thus helping you find an appropriate message system with little or no phone charges. The attrition rate among these systems seems to be high, so if you find difficulty in reaching one number, try another. We hope you enjoy the diversity of this list.

```
*****
* PUBLIC ACCESS MESSAGE (and file transfer) SYSTEMS *
* (P.A.M.S.) last updated 11/21/82 *
*
* Compliments of Peoples' Message System, Kenmore, WA *
* (206) 486-2368 *
* Compiled and maintained by Don Purvis *
* (with a lot of help from his friends) *
*
* Please send updates/corrections to: *
* P M S Kenmore or TCS478 *
*****
```

```
*24 denotes 24-hour operation
#1 denotes original system of that type
-rb denotes call, let rins once and call back
-so sexually oriented messages
-rl religious orientation
! new system or new number to existins system
% Supports VADIC 1200 baud operation
% Supports 212A 1200 baud operation
% Supports BAUDOT operation
```

Regular updates of this list may be found on
CompuServe MAUG X44, The Source PUBLIC 112, and most
participating independent PMS systems.
Current filesize is 31,469 bytes.

```
ABBS ABACUS II, Toledo, OH.....(419) 865 1594
ABBS AOS, Atlanta, GA.....(404) 733 3461*24
ABBS Akron Disital Group, Akron, OH.....(216) 745 7855*24
ABBS Apple Crate I, Seattle, WA.....(206) 935 9119
ABBS Apple Crate II, Seattle, WA.....(206) 525 5410
ABBS Apple Group N.J., Piscataway, NJ.....(201) 968 1074
ABBS Apple-Mate, New York, NY.....(201) 864 5345
ABBS Baileys Computer Store, Austusar, GA.....(404) 790 8614
ABBS Baton Rouge, LA.....(504) 291 1360
ABBS Byte Shop, Ft. Lauderdale, FL.....(305) 486 2983
ABBS Byte Shop, Miami, FL.....(305) 261 3639
ABBS Calvary Mission Church, Mnpls, MN.....(612) 471 0252-rl
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ABBS Computer Corner, Amarillo, TX.....(806) 355 5610
ABBS Computer Conspiracy, Santa Monica, CA... (213) 829 1140
ABBS Computer Crossroads, Columbia, MD.....(301) 730 0922
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A-C-C-E-S-S Wyckoff, NJ.....(201) 891 7441*24
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AMIS Chicago, IL.....(312) 789 3610*24
```


Bring the flavor of Unix to your Z80 CP/M system with Unica

*"Unicum: a thing unique in its kind, especially an example of writing.
Unica: the plural of unicum."*

The Unica: a unique collection of programs supporting many features of the Unix operating system never before available under CP/M. The Unica are more than software tools; they are finely crafted instruments of surgical quality. Some of the Unica are:

- bc - binary file compare, display differences in hex
- cat - catenate files (vertically)
- cp - copy one or more files, even between users
- dm - disk mapper, reports free blocks and directory space
- fid - file identification by unique numbers (CRC's)
- hc - horizontal file catenation and column permutation
- ln - create file links (multiple names for one file)
- ls - intelligent directory lister, optional multi-columns
- mv - move (rename) files, even between users
- rm - remove (delete) files, with optional verification
- sc - source file compare, with resynchronization
- sfa - set/reset file attributes, optional verification
- sp - spelling error corrector, with 80,000 word dictionary
- sr - search multiple files for a pattern
- st - in-memory file sorter, optional duplicate line omission
- tee - pipe fitting (copy input stream to multiple outputs)
- tr - transliterate (translate character codes)
- wc - word counter, counts characters, words, and lines
- wx - word extractor, copies each word to a separate line

Each Unicum understands several flags ("options" or "switches") which control program alternatives. No special "shell" is needed; Unica commands are typed to the standard CP/M command interpreter. The Unica package supports several Unix-like facilities, such as filename user numbers:

```
sc data.bas;2 data.bas;3
(compares files belonging to user 2 and user 3);
Wildcard patterns:
rm -v *tmp*
(types each filename containing the letters TMP and asks whether to delete
the file);
I/O redirection:
ls -a >proj.dir
(writes a directory listing of all files to file "proj.dir");
Pipes:
dm b: | sr free >lst:
(creates a map of disk B:, extracts those lines in the map which contain the
word "free", and prints them on the listing device).
```

The Unica are written in XM-80, a low level language which combines rigorously checked procedure definition and invocation with the versatility of Z80 assembly language. XM-80 includes a language translator which turns XM-80 programs into source code for MACRO-80, the industry standard assembler from Microsoft. It also includes a MACRO-80 object library with over forty "software components", subroutine packages which are called to perform services such as piping, wildcard matching, output formatting, and device-independent I/O with buffers of any size from 1 to 64k bytes.

The source code for each Unicum main program (but not for the software component library) is provided. With the Unica and XM-80, you can customize each utility to your installation, and write your own applications quickly and efficiently. Programs which you write using XM-80 components are not subject to any licensing fee.

Extensive documentation includes tutorials, reference manuals, individual spec sheets for each component, and thorough descriptions of each Unicum.

Update policy: each Unica owner is informed when new Unica or components become available. At any time, and as often as you like, you can return the distribution disk with a \$10 handling fee and get the current versions of the Unica and XM-80, with documentation for all new or changed software.

The Unica and XM-80 (which requires MACRO-80) are priced at \$195, or \$25 for the documentation. The Unica alone are supplied as *.COM executable files and are priced at \$95 for the set, or \$15 for the documentation. Software is distributed only on 8" floppy disks for Z80 CP/M version 2 systems. All orders must be paid in advance; no COD's or purchase orders, please. Quantity discounts are available. Shipment outside of the US or Canada costs an additional \$20. Bank checks must be in US funds drawn on a US bank.

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CBBS Long Island, NY.....	(516)	334	3134*24
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CBBS RAMB, Rochester, NY.....	(716)	244	9531
CBBS Richfield ?	!(612)	423	5016
CBBS Strictly Software, Honolulu, HI.....	!(808)	944	0562
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COMNET-80 Akron, OH.....	!(216)	645	0827*24
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COMNET-80 Riverside, CA.....	!(714)	877	2253
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CONNECTION-80 Little Rock, AS.....	(501)	372	0576
CONNECTION-80 Manhattan, NY.....	(212)	991	1664
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CONNECTION-80 Peterborough, NH.....	(603)	924	7920
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CONNECTION-80 Vanail, Milwaukee, WI.....	(414)	271	7580*24
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CONFERENCE-TREE #4, Santa Monica, CA.....	(213)	394	1505
CONFERENCE-TREE Anchorage, AK.....	(907)	344	5251
CONFERENCE-TREE Computerland, Honolulu, HI.....	!(800)	487	2001*24
CONFERENCE-TREE Flasship, Denville, NJ.....	(201)	627	5151*24
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CONFERENCE-TREE ?, New Jersey.....	(201)	627	5151
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DIAL-YOUR-MATCH #1.....	(213)	842	3322-so
DIAL-YOUR-MATCH #3.....	(912)	233	0863-so
DIAL-YOUR-MATCH #4.....	(213)?	704?	9819-so
DIAL-YOUR-MATCH #7.....	(212)	456	2528-so
DIAL-YOUR-MATCH #9.....	(213)	345	1047-so
DIAL-YOUR-MATCH #11.....	(213)	242	1882-so
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 RCP/M RBBS Huntsville, AL.....(205) 895 6749-rb
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 Remote Northstar NASA, Greenbelt, MD.....(301) 344 9156
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 Remote Northstar Santa Barbara, CA.....(805) 964 4115
 Remote Northstar Virginia Beach, VA.....(804) 340 5246

ST80-CC Lance Micklus, Inc. Burlington, VT.....#1 (802) 862 7023*24
 ST80-PBB Monroe Camera Shop, Monroe, NY.....(914) 782 7605

Serial Connection

continued from page 26

eight representing parity. Here again, the amount of data bits between the two devices should match.

HOW TO TROUBLE SHOOT YOUR INTERFACE PROBLEM

The RS-232C is an indestructible interface. Short of plugging it into a wall socket, the equipment probably won't be damaged by experimenting. If it doesn't work, it can be played with until it does work. Here are some helpful hints.

Problem: The power is on, the devices are connected, but the printer won't print.

Solution: There is probably a cabling problem. Switch lines two and three. If that doesn't work, switch lines four and five. If you're still not successful, short lines six, eight and twenty together.

Problem: The printer prints out the correct number of characters, but half or all of them are not what they are supposed to be.

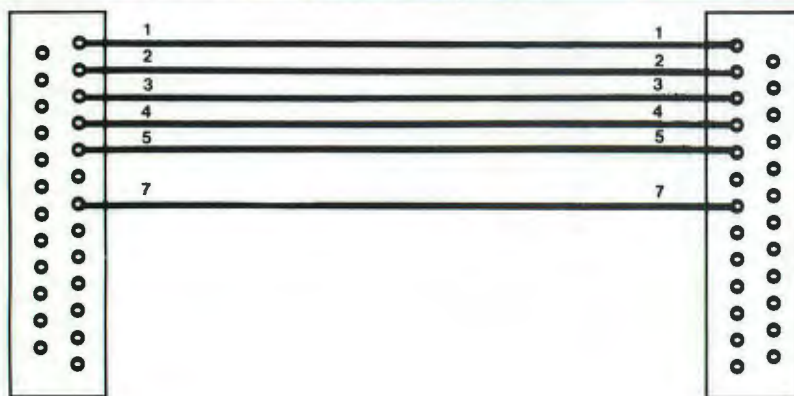
Solution: The parity bits aren't properly set.

Problem: The printer prints out garbage and the number of garbage characters doesn't match the number of characters sent to the printer.

Solution: The baud rate is incorrect.

CONCLUSION

A common quality among data processors is persistence. Most software people will work on a software bug for a week and never complain. Well, maybe once. . . That same type of persistence is often needed to overcome RS-232C problems. They won't always work the first time, but they will always work.



DEVICE A	
PIN	FUNCTION
1	Frame Ground
2	Send data
3	Receive data
4	Request to send
5	Clear to send
7	Ground

DEVICE B	
PIN	FUNCTION
1	Frame Ground
2	Receive data
3	Send data
4	Request to send
5	Clear to send
7	Ground

Figure E

The 202 protocol modem can only transmit data in one direction so the device it is connected to must bring line four active when it wants to transmit and wait for line five to become active.

Videotex continued from page 40

WHAT ABOUT CP/M?

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 - Banking
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market quotations

- Miscellaneous educational material catalogues of all kinds reviews of books, movies

The list is endless, but consider the following; (1) the personal computers need decode software, (2) providers of information need hardware and software to present their wares, (3) many current applications will need to be revised for Videotex I/O, and (4) hundreds of specialized data bases will need to be kept current, which implies that Videotex considerations will creep into major subsystems like database managers.

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CP/M REVIEW January/February 1983

PIP

continued from page 33

```
IN      CSTAT ;GET READY STATUS
ANI     STRDY ;MASK XMITER READY
CPI     STVAL ;COMPARE WITH READY VALUE
JNZ     CO     ;REPEAT TILL XMITER EMPTY
MOV     A,C    ;
OUT     CDATA ;PUT DATA OUT NOW THAT READY
RET
```

```
END
;END OF FILE
```

The procedure for making a patched PIP.COM would be as follows. In the example, lower case characters are generally those typed by the operator and <cr> indicates depression of the carriage return.

```
B>ddt pip.com <cr>
DDT VERS 2.2
NEXT PC
1E00 0100
-ippat.hex <cr>
-r <cr>
NEXT PC
1E00 0000    <--Note ending PIP address so to SAVE
01EH        1 or 30 pages after patching.
```

```
-d100,17 f <cr>
<--Dump to see installed patch.
```

```
0100 C3 0A 01 C3 37 01 C3 48 01 1A CD 10 01 C3 00 00
.....7...H.....
0110 21 A0 01 3E 76 D3 DF 7D D3 DD 7C D3 DD 06 14 AF
!..>v..}.l.....
0120 D3 CF 05 C2 20 01 3E 40 D3 CF 3E 4E D3 CF 3E 37
....>@..>N>7
0130 D3 CF DB CE DB CE C9 DB CF E6 02 FE 02 C2 37 01
.....7.
0140 DB CE E6 7F 32 09 01 C9 DB CF E6 01 FE 01 C2 48
.....2.....H
0150 01 79 D3 CE C9 2F 4F 55 54 3A 53 50 41 43 45 29
.Y.../OUT:SPACE)
0160 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
0170 28 49 4E 50 3A 2F 4F 55 54 3A 53 50 41 43 45 29
(INP:/OUT:SPACE)
- ^c <--Exit DDT to system
B>save 30 pippat.com <cr> <--save off patched
PIP COM
```

The patched PIP.COM is now ready to use. For initial debugging, the .PRN file listing of the patch assembly may be used in conjunction with DDT to test the new drivers.

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Flexibility of C

continued from page 23

FLEXIBLE PROGRAM STRUCTURES

C programs consist of a single MAIN function with any number of sub-functions. Individual functions can be compiled together as one large source file or compiled as separate source files and linked together afterward.

Functions may return a value with the RETURN statement. The following function returns the absolute value of the value passed to it:

```
abs (n)
int n;
{
if (n < 0) return (-n);
else return (n);
}
```

There are no subroutines in C, only functions that don't return a value.

FLEXIBLE ENVIRONMENT

C compilers now exist for over a dozen major computer families from micro to mainframe, and more are on the way. With some care, applications can be written in C and run on all of these computers with no changes.

All C compilers generate native code; no slow intermediate pseudo-code or run time interpreters like popular versions of Pascal and BASIC. And all C versions benefit from the flexibility, efficiency, portability, and readability of C. Shouldn't you?

Within the CP/M Operating System, the "BIOS" (Basic Input/Output System) contains the device related drivers, and are generally supplied by the manufacturer of your microcomputer system.

3. System Supplied Utilities.

The operating system supports you with a suitable collection of utilities required to manipulate data and programs within your computer's environment.

System supplied utilities would be expected, at a bare minimum, to include:

- Editing facilities to create and modify data or programs.
- File manipulation utilities to provide the ability to copy, delete, print, or filter files of data of programs.
- System status command to display the system's current capacities within memory and on disk.
- An appropriate complement of languages if local program development is a requirement.
- System debugging facilities to support the development of locally-generated programs.
- Operating system facilities to adapt to unique configurations.

CP/M OPERATING SYSTEM

One of the major attributes of the CP/M Operating System is the ability to have a specific piece of software run successfully on many different system configurations. This ability is provided primarily by three logical interfaces:

1. The assignment of logical system devices.

Most of the difficulty encountered by transient programs occurs during communication to the outside world, via the system's hardware components. Most programs require relatively few devices to run properly. CP/M has established four logical devices, CON: (system console), RDR: (system input device), PUN: (system output device) and LST: (the system listing device). CP/M compatible programs try to live within this framework.

The ability also exists within CP/M to logically assign specific hardware drivers to these logical devices. As a result, it is within your power as a user to reassign dif-

ferent hardware components to your application programs. To further review this capability, I suggest reading about the "STAT" command in any CP/M manual.

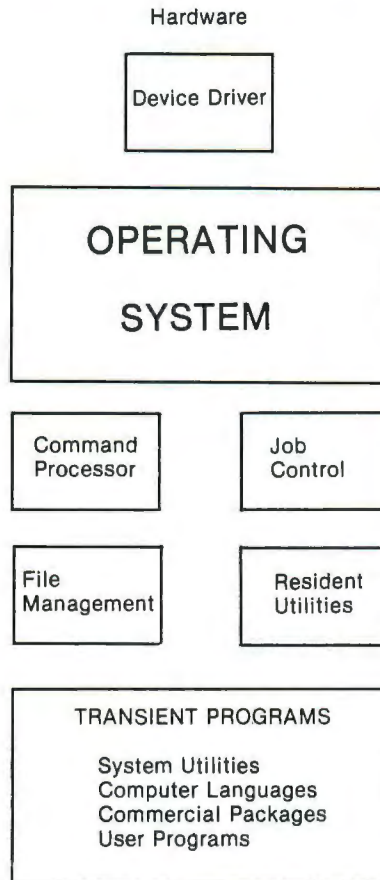


FIGURE 2. Operating Environment

2. The standardized calling sequences for transient program input/output requests of the operating system's services.

In order for a CP/M compatible program to utilize the logical devices, a standard set of calling sequences have been defined to provide specific utilities (i.e., type a string of characters on the console, send a character out to the hardware component currently assigned to the PUN: logical device). It is through the programs use of these sequences or "operating system requests" that device independence is realized.

3. The use of standard driver interfaces and absolute transfer vectors (jumps), used by CP/M and the unique hardware drivers.

This standardization has not been designed for the transient pro-

gram, but for manufacturers to interface their unique hardware components to the system. As mentioned earlier, the BIOS contains the specific hardware drivers. It is the function of your microcomputer's manufacturer to provide the BIOS.

The subject of operating system design is a major component of computer science; however, we hope that this sampling has provided some insight into the further understanding and enjoyment of your microcomputer system.

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dBASE II

continued from page 30

operations, subsequent releases of dBase II are expected to provide for simultaneous access to shared fields.

Taking advantage of the INDEXing feature, structured programming with the dBase II host language, and planning around some of the limitations of dBase II will be subjects of future columns. Meanwhile, we are hoping to hear from those of you who are already using dBase II, whether you are a struggling neophyte or an accomplished data base programmer.

Alternative

continued from page 31

peripherals. The Bridge, therefore, consists of an inner simulator, a series of virtual peripherals, and the necessary file transfer utilities necessary to access the host peripherals.

In October of 1982, VMI announced the Z-Board, the hardware accelerator for the Digital Equipment Corporation version of The Bridge. The Z-Board is a circuit board which features four Z80A microprocessors, 256K bytes of RAM, and a bit slice state machine to handle the backplane interface. One Z-Board enables the first four users who invoke The Bridge task to be allocated their own Z80A CPU with a full complement of 64K bytes of RAM. Additional users on this Virtual Microcomputer System are handled by the 8080 inner simulator of The Bridge software, thus providing flexibility in the number of users handled simultaneously by the task. Furthermore, multiple boards can be placed in the minicomputer's backplane. The net effect of The Bridge with Z-Board configuration is to allow users to enjoy faster than microcomputers execution speed of CP/M application programs, yet impart a negligible load on the minicomputer's CPU. Application execution can be achieved from any terminal hooked up to the mini, while other users may operate under the host system. Given this capability, the end-user has access to the efficient inexpensive world of microcomputer software, while retaining access to the minicomputer's superior system peripherals.

Alternative


To further complete the Virtual Microcomputer System, VMI recently introduced PhoneLink. This software utility allows the transfer of ASCII data and binary files between mini and micro computers. Having hardwired or connected these systems with a modem, there is the option to transfer files and programs in the CP/M environment or to use the micro as a dumb terminal on line to the mini. In essence, PhoneLink effectively networks a variety of different CP/M-based microcomputers with one or more minicomputers.

Originally, The Bridge was targeted towards minicomputer users. However, due to its cost-effectiveness, there has evolved a market within the microworld. We have noted the advantages gained by CP/M end-users by dedicating a minicomputer to a Bridge and several Z-Boards. This configuration enables the end-user to make use of the inexpensive, user-friendly software, and yet enjoy the benefits of a professionally managed minicomputer system. Specifically, these users can now use the minicomputer as an effective data base, access its system peripherals, and make full use of the potentially large file space inherent to the system.

With The Bridge, Z-Board, and PhoneLink, there is now an effective link between the mini- and micro-worlds. Given the continued proliferation of microcomputers, end-users can expect to see large numbers of "bridges" in the future. Aside from simply establishing these and more sophisticated links with all types of minicomputers, a lucrative challenge lies in integrating microcomputers into the mainframe world. Virtual Microsystems is dedicating itself to this philosophy of linking microcomputers to the non-CP/M world.

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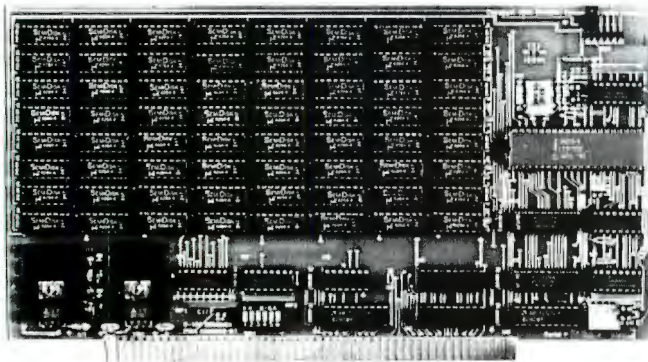
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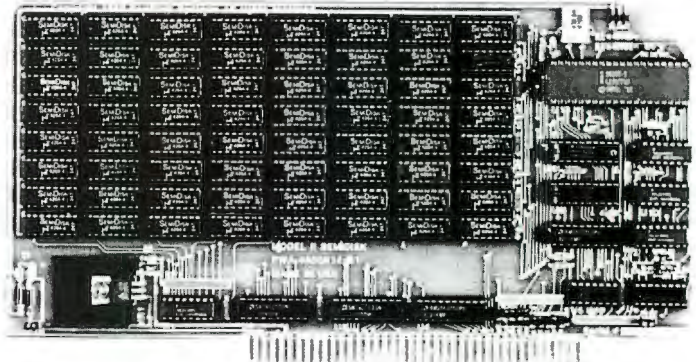
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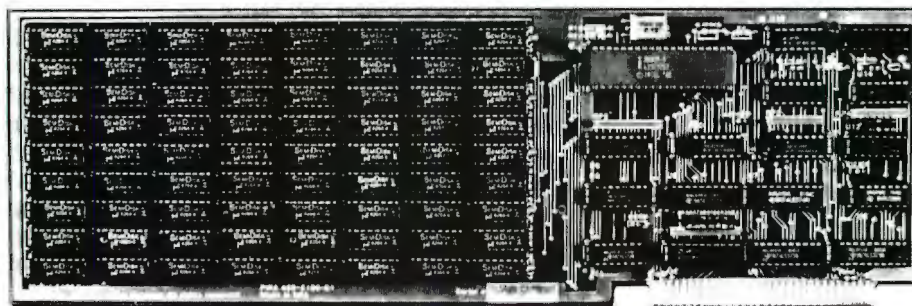
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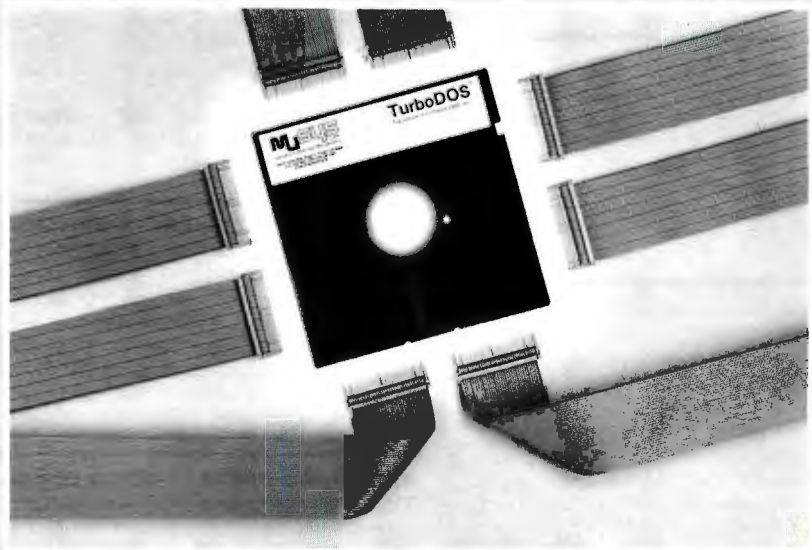
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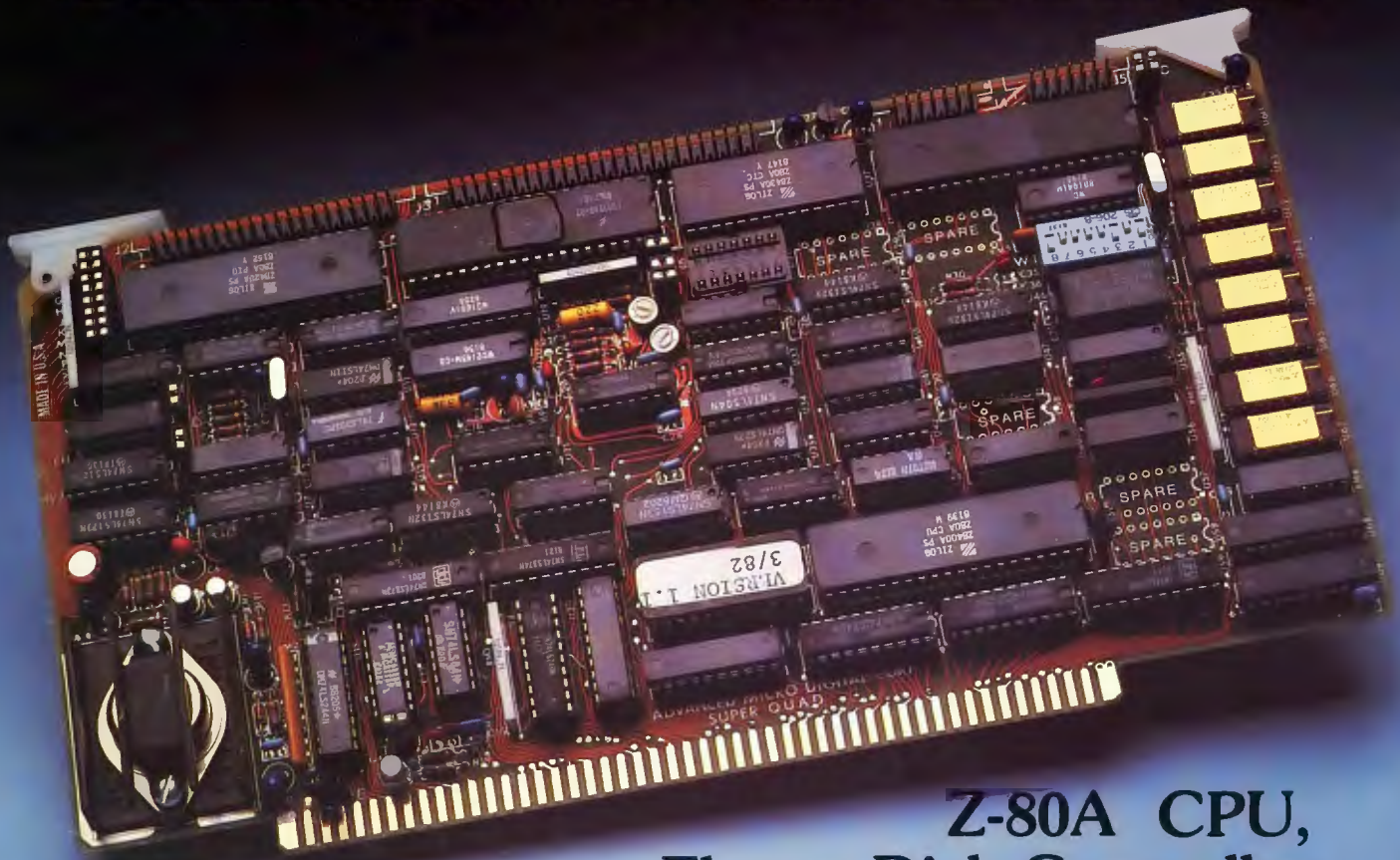
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